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The International Journal of Orthodontia and Oral Surgery

A Monthly Journal Devoted to the Advancement of the Sciences of Orthodontia, Oral Surgery, and Dental and Oral Radiography

Martin Dewey, D.D.S., M.D., Chicago
Editor-in-Chief

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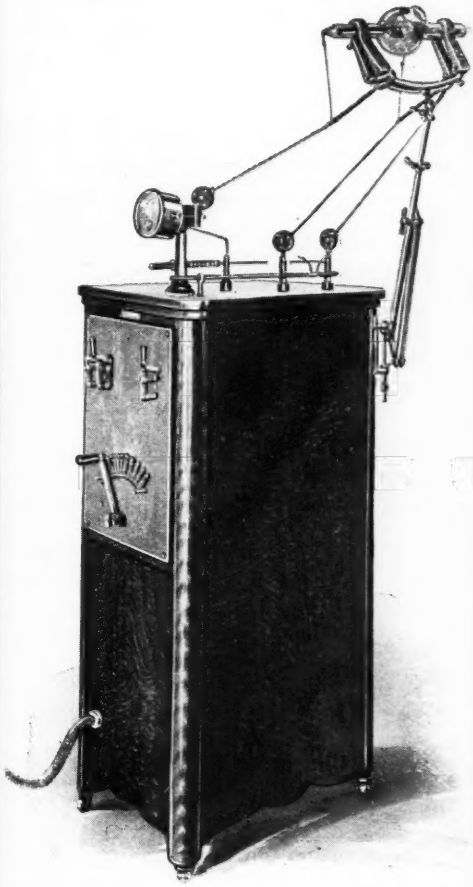

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VOL. VI ST. LOUIS, APRIL, 1920 NO. 4

ORIGINAL ARTICLES

THE MUSCLES AND LIGAMENTS OF THE MANDIBLE AS RELATED TO CERTAIN FUNCTIONS AND DEVELOPMENT

BY MARTIN DEWEY, M.D., D.D.S., CHICAGO, ILL.

THERE is no bone of the body that is more influenced by the attachment of the muscles than is the mandible, neither do we find any bone that has such varying groups of muscles attached to it in relation to the origin, functions, and nerve supply. The mandible has often been classed as a bone of environment, and as a result of these environments various muscles have been brought to play to perform various functions, all of which have an influence upon the mandible. It must be remembered that the mandible of man is concerned in five functions: first, as an organ of mastication for the support of the teeth; second, in the act of respiration; third, in speech; fourth, in deglutition in conjunction of the hyoid muscles and muscles of the pharynx; and fifth, it has an esthetic function in that it forms the lower part of the face. It has attached to it various groups of muscles which can be grouped as muscles of mastication, respiration, deglutition, speech, and expression.

The muscles associated with the mandible also have a very widely distributed nerve supply, which, however, can be divided quite accurately into certain groups connected with some particular function. Briefly, we may say that the muscles associated with the mandible receive their nerve supply from the fifth, seventh, eleventh, and twelfth cranial nerves. It is well to remember that because of this wide distribution of nerve supply, certain groups of muscles may be particularly affected without any change occurring in other groups. For example, we may have lack of development in the muscles of expression, which are controlled or supplied by the seventh nerve, while the muscles of mastication which are supplied by the fifth nerve may have developed normally and be performing their proper functions.

It is also well to remember that none of the muscles associated with the

mandible play a direct part in holding or keeping the mandible in any definite position. The mandible is maintained in a certain position by the ligaments, the inclined planes of the teeth, and by atmospheric pressure, in which the muscles play an indirect part. In a consideration of atmospheric pressure we must remember that the muscles of expression and respiration as well as deglutition play an active part in producing atmospheric conditions in the nasal and oral cavity which hold the mandible in position. It is because of the difference in the atmospheric relations between normal and abnormal breathers that we find the mandible assuming two different degrees of dvelopment, one of which results in a normal occlusion, and the other in an abnormal development of the mandible.

In considering these muscles of the mandible, it is well to remember that

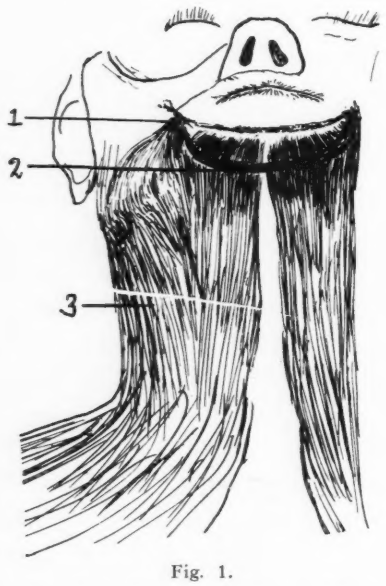


Fig. 1.

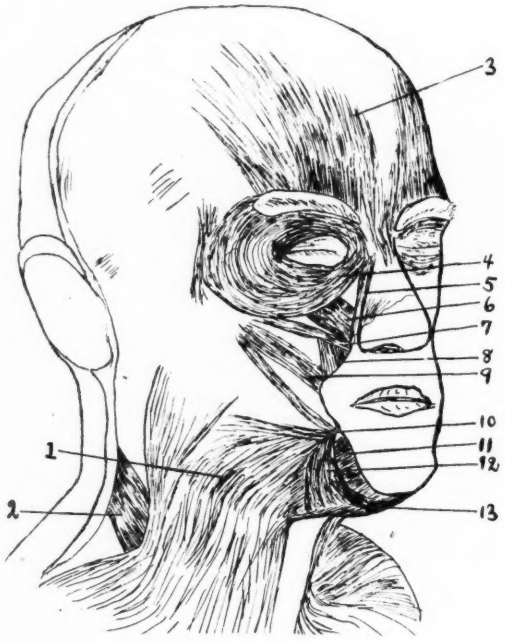


Fig. 2.

Fig. 1.—*1.* M. triangularis. *2.* M. transversus menti. *3.* M. platysma myoides.
Fig. 2.—*1.*—Platysma. *2.* Sternocleidomastoideus. *3.* Frontalis. *4.* Orbicularis oculi. *5.* Labii quadratus caputangulare (nasi). *6.* Caput infraorbit. *7.* Zygomaticus minor. *8.* Labii quadratus superioris. *9.* Zygomaticus major. *10.* Risorius. *11.* Labii inferioris. *12.* M. triangularis. *13.* M. transversus menti.

they have different nerve distributions that can also be separated and divided into groups and layers each one of which may be said to have certain definite and distinct functions from the others. We will consider them more in the order of their distributions rather than in the order of their importance. The external surface of the mandible, including the body of the mandible after the removal of the skin, will be found to be covered with a superficial layer of muscular fascia, which is composed of practically four muscles, some of which have been grouped by writers as a single muscle. We have first the platysma myoides which is a small flat muscle that is decidedly a muscle of expression, and has practically no influence upon the mandible (Fig. 1). Great importance has been laid upon this muscle by Dr. Rogers[1] as being concerned in the lack of development of the mandible in mouth breathers, but from actual dissections

and consultations of various anatomic authorities, we find that no one has considered the muscle of any importance in producing any change on the mandible, except Dr. Rogers.

The platysma arises from the superficial fascia which covers the clavicular part of the pectoralis major and deltoid muscles and is attached to the outer surface of the face and the inferior maxilla and the angle of the mouth where the fibers blend with anguli oris and orbicularis oris. The action of this muscle is to draw the angle of the mouth downward and outward, and, secondly, it may act as a feeble depressor of the mandible, and third, it raises and wrinkles the skin of the neck. The muscle does not really belong to the group known as a depressor of the mandible, but belongs to the facial muscles, which can be further understood when we remember that the nerve supply of the platysma is the inframandibular branch of the cervicofacial division of the facial nerve. Associated in this region with the platysma is the triangularis muscle which is flat and triangular and lies below the angle of the mouth and covers the foramen mentale. Its origin is just below the mental foramen and is inserted in the skin at the corner of the lip. Connected with the triangular muscle is the transversus menti which is made up of fibers that run from the platysma and join the fellow on the opposite side. The action of the transversus menti and the triangularis is to draw the corner of the mouth down and act as depressors of the upper lip. These muscles are also supplied by the facial nerve.

Fig. 2 also shows another muscle that may be considered as one of the facial group; namely, the risorius which has its origin from the masseter fascia, inserted at the angle of the mouth at the point of the insertion of the triangularis muscle. The risorius when acting alone draws the corner of the mouth backward and forms a dimple. It has often been called the "Laughing Muscle" and while being associated with the triangularis and transversus menti, it produces a directly opposite facial result. The risorius tends to denote an expression of pleasure, the action of the triangularis and the transversus menti by themselves drop the corners of the mouth producing a directly opposite effect, or one of sadness. The risorius is also supplied by branches of the facial nerve. These four muscles have very little direct action upon the mandible, but make up a portion of the superficial layer and are classed as muscles of expression because of the action and nerve supply. The platysma is the only one which has any fibers inserted directly into the body of the mandible, these fibers are of such small importance as to practically eliminate the platysma as a depressor of the mandible. However, in mouth breathing the inactivity of these muscles may have a detrimental effect in giving an unpleasing expression to the patient's face as is so often noticed in disturbed atmospheric relations.

Muscles of expression which play a part in the action of the upper lip and therefore become important factors in exerting an indirect influence upon the mandible in mouth breathers and abnormal lip habits, may be considered in groups according to their action. We find three muscles which may be termed the quadratus labii superioris made up of the three elevators of the upper lip and the nose; these muscles arise from a point corresponding to the nasal process of the maxillary bone; the maxillary bone in the region of the infraorbital foramen and the zygomatic portion of the maxillary. They all converge downward

and inward towards the sulcus nasolabialis, and in action draw the alæ of the nose and upper lip upward and outward. This group of muscles is supplied by the facial nerve. The zygomaticus major and elevator labii anguli oris arise, respectively, from the zygomatic region of the maxillary and the upper part of the canine fossa, are inserted into the angle of the upper lip and pull the upper lip and angle of the mouth upward. The zygomaticus major located still farther outward on the surface of the malar bone near the zygomatic arch runs downward and inward and is attached in the angle of the mouth to the lower border and the above-named muscles. All of these muscles are supplied by the facial nerve. Acting together they raise the upper lip. The quadratus labii inferioris can be mentioned with the depressors of the lips, with the transversus menti, and arise from the platysma region and are inserted at the border of the mouth and tend to draw down the corners of the mouth in an opposite direction to the muscles which have been previously named. The elevator mentalis shown

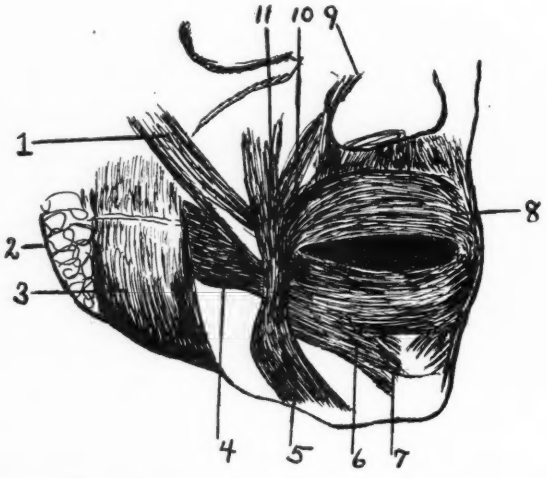


Fig. 3.—*1.* Zygomaticus M. *2.* Parotid. *3.* Masseter. *4.* Buccinator. *5.* M. triangularis. *6.* M. incisivus labii inferioris. *7.* M. mentalis. *8.* Obicularis oris. *9.* Transversus nasi. *10.* Labii superioris. *11.* M. canius.

in Fig. 3, arises from the incisal fossa of the mandible and is inserted into the skin of the chin. The action of this muscle is to raise the chin, as a result of which the lower lip is protruded.

The orbicularis oris is composed of fibers which surround the oral opening and which is contributed to by some of the fibers of all the muscles which have been mentioned and fibers which may be said to be common to the orbicularis oris alone. The orbicularis oris is a complex muscle consisting of three layers. The superficial layer is the prolongation of the fibers of the elevators and depressors at the angle of the mouth and extends as far as the center of the lip, but the fibers are not continuous to those of the opposite half. They are reinforced by the elevators of the upper lip and the zygomaticus, risorius, platysma and depressor labii inferioris. The middle layer is made up of the fibers derived from the buccinator. The deeper layer is composed of fibers which may be said to consist entirely of muscular fibers contributing to the orbicularis alone, and consists of two pairs of muscles associated with the upper portion, namely,

the musculus incisivus and nasolabialis. One pair is associated with the lower lip, known as the musculus incisivus, which arises from the incisor fossa of the mandible and turns outward blending with the other fibers mentioned. These various fibers are supplied with branches of the facial nerve and the action of the muscle is to close the oral opening and press the lip against the alveolar margin. The depressors and elevators of the lip as well as the zygomaticus, may be said to constitute the middle layer of the muscles of expression, the superficial layer being composed of the platysma, the triangularis, the transversus menti and the risorius. The middle layer is derived from the buccinator. The deep layer is the musculus incisivus superioris and nasolabialis and musculus incisivus inferioris, the last three pairs being already mentioned in conjunction of the orbicularis.

The buccinator muscle is much larger than any of the others which we have mentioned, with the possible exception of the orbicularis oris which was a blending of all the various muscles and fibers of expression, and we therefore feel the buccinator should be given more attention than we have paid to the other muscles. The action of the buccinator is little understood, and it has often been classed as a muscle of mastication and so considered by some anatomists. The buccinator belongs to the muscles of expression and becomes a muscle of mastication indirectly, only because it may be influential in keeping the food under the surface of the molars and premolars by contraction. It has no direct action on the movement of the mandible, although it is attached to both the mandible and the maxilla, which are considered points of origin. The buccinator rises from the outer surface of the alveolar border of the mandible and the maxilla opposite the molar teeth and a portion of the fibers arise from the anterior surface of the pterygo-mandibular ligaments. The fibers are inserted in the angle of the mouth and help to make up the middle strata of the orbicularis oris. It is supplied by the temporo-facial branches of the facial nerve, and by the buccal branches of the cervicofacial division. The nerve supply of this muscle therefore places it outside of the muscles of mastication which shows it is developed from the same structures that have made up the other muscles of expression. The action draws the angle of the mouth outward and presses the lips and cheeks against the teeth to force food under the masticating surfaces. The buccinator muscle is penetrated by the duct of the parotid gland as shown in Fig. 3.

It should also be remembered that all of these muscles of expression which are attached to the mandible are attached to the body of the mandible and none of them concerned with the opening or closing of the mouth. The muscles of mastication consist of four pairs of muscles, being four right and four left, all of which are inserted into the mandible and none of which have their origin or any fibers arising from the maxillary. These are the muscles which supply the movements of the mandible when the masticating or incisal functions of the teeth are being performed. We also find certain of these muscles are quite specialized in regard to their masticating functions, some more important than others, and as a result of this we find them developed in different degrees according to whether the incisors or molars are performing the greatest masticating functions. Fig. 4 shows the superficial portion of the masseter which arises from the anterior two-thirds of the lower border of the zygomatic arch and the

deep portion arises from the posterior third of the lower border and the whole of the internal surface of the zygomatic arch. The superficial portion of the masseter fibers are inserted in the lower half, the deep portion in the upper half of the outer surface of the ramus extending from the inferior border of the ramus to a point very close to the coronoid process. The action of the masseter is to close the mouth or move the mandible upward. It is particularly well developed in those animals which perform the masticating functions on the molars. It is therefore related to the occlusion of the molars and premolars. Fig. 4 also shows the origin of the temporal muscles in that it gives the extent of the temporal fossa which extends as high as the inferior temporal ridge of the frontal and parietal bone and as low as the infratemporal crest of the great wing of the sphenoid. The deeper fibers of the temporal muscles arise from the deep portion

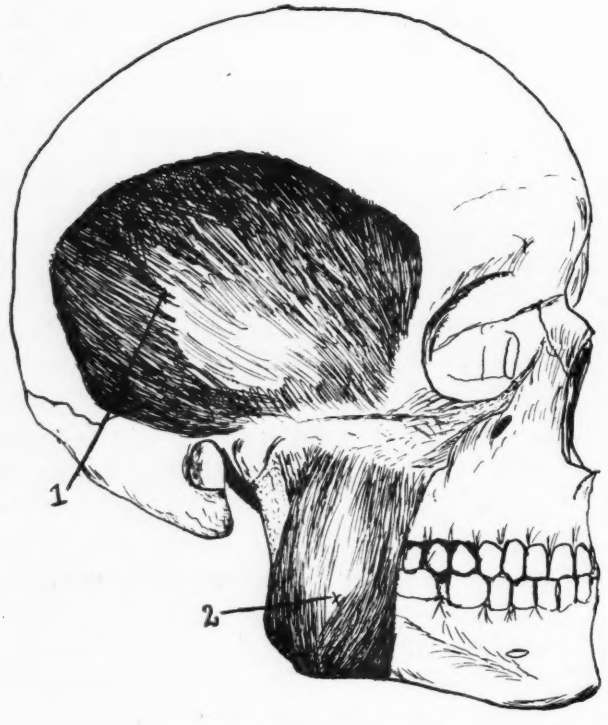


Fig. 4.—*1.* Fascia temporalis. *2.* Masseter.

of the fossa, while the external fibers are, of course, attached to the temporal fascia. Fig. 5 shows the zygomatic arch removed and the gathering together of the fibers of the temporal muscles to be inserted in the coronoid process of the mandible. The action of the temporal muscle is to pull upward on the coronoid process, but owing to the wide origin of the fibers of the temporal, all of the fibers do not have the same action during mastication. In Fig. 5 it will be observed that the anterior fibers of the temporal run almost directly downward and become active when closing the mouth. The middle, posterior, and lower portion of the fibers of the temporal run downward and forward to the coronoid process, with the result that the action of the lower fibers will pull the mandible backward. When the mandible is protruded by the action of the external and internal pterygoid muscles to bring the edge of the incisors together for incision,

the middle and posterior fibers of the temporal acting on the coronoid process in conjunction with the anterior fibers pull the mandible backward and upward with sufficient force to perform incision. The action of the temporal muscle in moving the mandible posteriorly during incision is not very well understood by certain men in the profession. The use of the temporal muscle has been recommended as one of the important factors in muscle training in distoclusion cases.[1] There is no question about the value of the friction of the muscle during mastication as a means of producing development, but the action of the temporal muscle in a distoclusion case, especially the posterior and lower fibers, might be detrimental, as they would have a tendency to pull the mandible distally, which is the thing some men seem to want to avoid, especially where they be-

Fig. 5.—*1*. M. temporalis. *2*. Zygomatic arch. *3*. Parotid duct. *4*. M. Buccinator. *5*. M. incisivus labii inferioris. *6*. M. incisivus superioris.

lieve they have moved the mandible forward in the correction of distoclusion. I very much doubt whether in the correction of a case of distoclusion any change occurs in the position of the mandible. I question the value of the action of the temporal in the retention of distoclusion cases, but also believe that no harm can result because of the fact that the mandible has not been moved forward in these distoclusion cases, which some men are inclined to think has occurred. If the mandible had been moved forward in the treatment of a distoclusion case, with the hope of keeping it forward, the muscular training and the education of the temporal muscle or continued use of the temporal muscle would be a detrimental factor because it would have a tendency to pull the

mandible distal to its old position. Both the temporal and the masseter are supplied by branches of the fifth cranial nerve.

The muscles of mastication, which are attached to the inner portion of the ramus, include the internal and external pterygoids. The action of these mus-

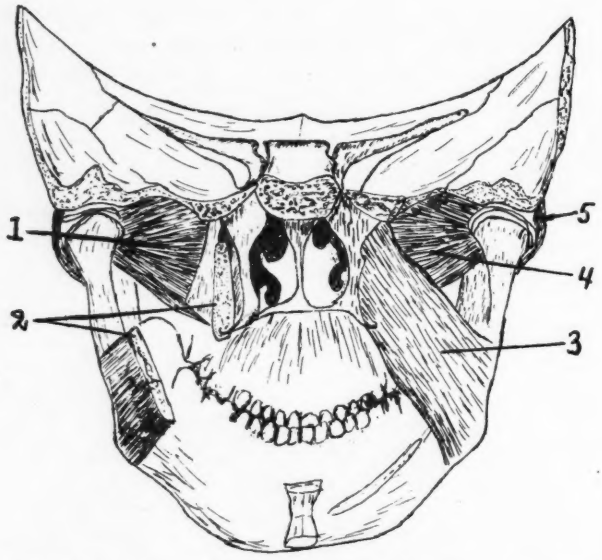


Fig. 6.—*1.* External pterygoid M. *2.* Internal pterygoid M. (cut). *3.* Internal pterygoid M. *4.* External pterygoid M. *5.* External capsular ligament.

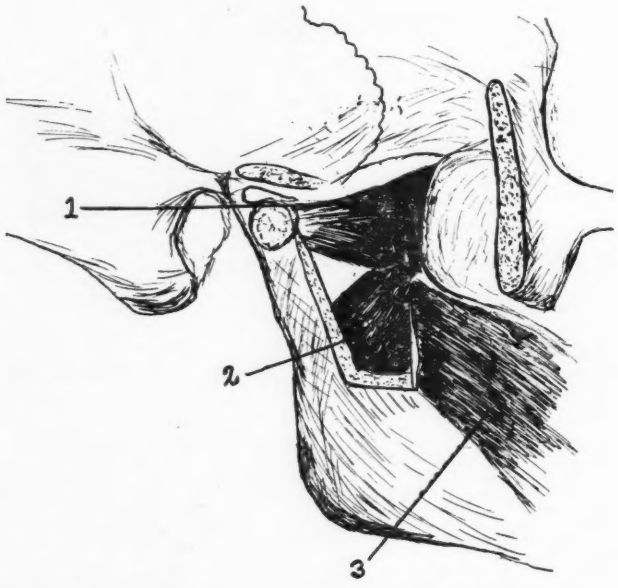


Fig. 7.—Pterygoid muscles, right side, external view. *1.* M. Pterygoid externus. *2.* Internal pterygoid M. *3.* M. Buccinator.

cles is very little understood, judging from the various papers that have been published upon the subject in times past. Fig. 6, 7, and 8 show different views of the pterygoid muscles. These figures have been made with as little regard to other anatomic structures as was possible and still give their correct origin and

insertion. Fig. 6 shows that both muscles arise from the internal and external surface of the outer pterygoid plate of the sphenoid, extend backward and outward. The internal pterygoid runs backward, downward, and outward; the external pterygoid runs almost directly backward and outward without any downward tendency. The internal pterygoid is inserted in the inner surface of the ramus near the angle of the mandible and directly internal to the insertion of the masseter. Action of the internal pterygoid is to close the mouth by pulling upward on the ramus and also slightly forward. However, the muscle most active in protruding the mandible is the external pterygoid, which, when acting on the right and left sides, moves the mandible forward. If the external pterygoid acts on one side alone in conjunction with the internal pterygoid on that side, the mandible will be swung forward and laterally with the result that the entire mandible will be shifted toward the opposite side as far as the temporomandibular ligament will allow it to be shifted. In the movement of the human

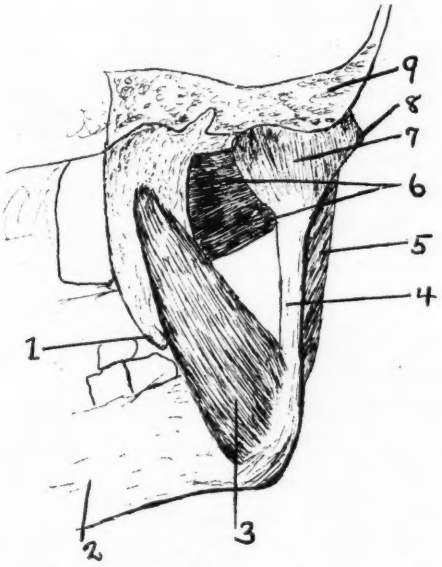


Fig. 8.—*1.* Hamulus pterygoideus. *2.* Mandible. *3.* Pterygoid interus. *4.* Ramus mandibulæ. *5.* Masseter. *6.* Pterygoid externus. *7.* Condyle. *8.* Zygomaticus. *9.* Os temporale.

mandible, the mandible does not rotate on the opposite condyle and the glenoid fossa because of the fact that the pterygoid muscles running backward and outward will necessarily produce a lateral shifting if only one muscle acts at a time. This lateral motion of the mandible is limited only by the length of the temporomandibular ligaments. Fig. 7 shows the zygomatic arch and a portion of the ramus of the mandible removed in order to give an external view of the external and internal pterygoids which have been called the internal muscles of mastication. In Fig. 8 the internal pterygoid plate of the sphenoid has been removed in order to show the origin of the internal pterygoid and the internal surface of the external pterygoid plate. The pterygoids are supplied by branches of the fifth cranial nerve.

It will be observed that all of these muscles attached to the ramus have action which moves the mandible forward, backward or upward. None of these muscles are so attached as to open the mouth, consequently the downward

motion of the mandible has to be supplied by another group of muscles which has been termed depressors of the mandible or elevators of the hyoid. Therefore the muscles associated in depressing the mandible have a twofold action. For example, if the mandible is held in position by the muscles of mastication, then those muscles which originally depressed the mandible become elevators of the hyoid. And in order for the mandible to be opened, a group of muscles which are known as the depressors of the hyoid have to be active and fix the hyoid bone so the elevators of the hyoid can depress the mandible. Consequently, the opening of the mouth is quite a complex proposition, because it calls into play the use of muscles which have other purposes than that of depressing the mandible.

Fig. 9 is the anterior view which shows the groups of muscles, concerned in depressing the mandible. This view includes a large number of the muscles of the neck. For purposes of relation the sternocleidomastoid is shown (Fig. 10) as arising from the sternum and the sternoclavicular articulation extends upward and backward, to be attached to the mastoid process of the temporal bone. This muscle is not concerned in the movement of the mandible, only in drawing the head downward and forward or when acting single in rotating the head. The sternocleidomastoid may be considered as a superficial muscle of the neck, along with the platysma, which has been removed.

The muscles indirectly concerned in the opening of the mouth because they are attached to the hyoid bone are the omohyoid and the sternohyoid. Also attached to the hyoid bone we have the thyrohyoid which becomes a depressor of the hyoid bone, because of the fact that the sternothyroid is inserted below it, and when the sternothyroid fixes the thyroid, the thyrohyoid becomes a depressor of the hyoid bone. We have four muscles which may be considered as active factors in the depressing of the hyoid bone or in fixing hyoid bones so the elevators of the hyoid become depressors of the mandible. The omohyoid as shown in Figs. 9 and 10 arises from the upper border of the scapula and is inserted in the outer third lower border of the hyoid bone, immediately external to the insertion of the sternohyoid muscle. This muscle is supplied by fibers of the hypoglossal nerve. The sternohyoid arises from the sternum and extends upward to the hyoid bone inserted into the hyoid at a point internal to the insertion of the omohyoid. This muscle and the omohyoid are the two long muscles which depress the hyoid bone and fix it in conjunction with the two short muscles, namely, the sternothyroid and the thyrohyoid. The lower portion of the sternothyroid is shown in Fig. 9, which extends from the sternum to the thyroid cartilage. The thyrohyoid is better shown in Fig. 10 where it extends from the hyoid bone at its insertion and has the origin at the thyroid cartilage. All of these muscles are supplied by branches of the hypoglossal or twelfth cranial nerves.

We have called attention to the fact that there are practically four muscles which are concerned in the fixation of the hyoid bone known as depressors of the hyoid which are also concerned in opening the mouth. In the region above the hyoid bone and between the mandible we also find four muscles, three of which again are directly attached to the mandible, while one is only active in elevating the hyoid. The digastric which is shown in Figs. 9, 10, and 12 is so

named because it is a double-bellied muscle, the posterior belly of which arises from the digastric fossa of the temporal, extends forward to the hyoid bone where it is bound down by the fascia of the stylohyoid muscle. That point is also the insertion of the anterior belly, the origin of which is the digastric fossa found on the internal surface of the mandible. While this muscle is named as a double-bellied muscle because of the insertion of the anterior and posterior belly into the hyoid bone, it is in reality the fusion of two muscles as shown by the nerve supply. The posterior belly of the digastric is supplied by a branch of the facial nerve, which therefore according to nerve supply is related to the muscle of expression. The anterior belly is supplied by the mylohyoid division of the inferior dental, which associates it more intimately with the mandible

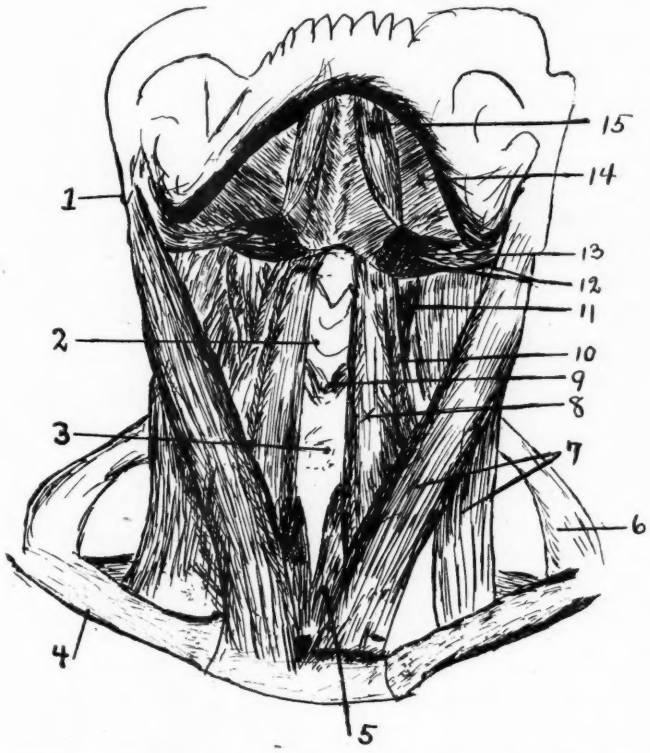


Fig. 9.—*1.* Mastoid process. *2.* Thyroid cartilage. *3.* Thyroid. *4.* Clavicle. *5.* Sternothyroideus. *6.* Trapezius. *7.* Sternocleidomastoideus. *8.* Sternohyoideus. *9.* Cricothyroideus. *10.* Omohyoideus. *11.* Thyreohyoideus. *12.* Stylohyoideus. *13.* Digastric muscle, posterior belly. *14.* Mylohyoideus. *15.* Digastric muscle, anterior belly.

than with the hyoid bone, and while it is classed as an elevator of the hyoid, it is in more reality a depressor of the mandible, that being the direct action of the anterior belly as shown by the origin, insertion, and nerve supply. The stylohyoid muscle which is shown in Figs. 9, 10, 11, and 12, arises from the styloid process of the temporal bone and is inserted in the anterior surface of the hyoid at the junction of the body and great cornu. This muscle like the posterior belly of the digastric is supplied by the facial nerve and consequently more intimately associated with muscles of expression than that of the hyoid or mandibular group.

The third muscle of this group, the mylohyoid which is shown in Figs. 9,

10, 11, 12, and 14 is a double muscle, which is united at the median line to form the diaphragma oris. It arises from the internal oblique ridge of the mandible and is inserted into the anterior surface of the hyoid bone. The

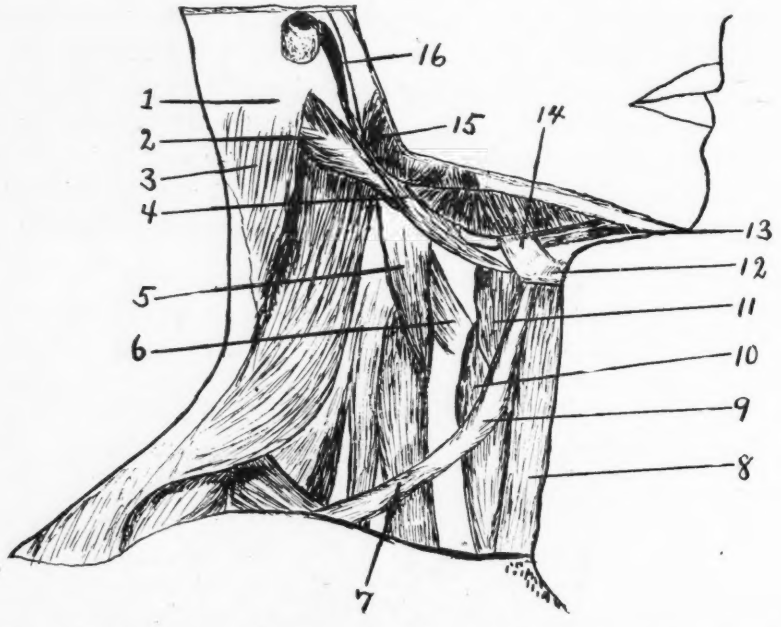


Fig. 10.—*1.* Styloid process. *2.* Masseter. *3.* Digastric muscle, posterior belly. *4.* Stylohyoideus. *5.* Sternocleidomastoideus. *6.* Trapezius. *7.* Omohyoideus. *8.* Sternohyoideus. *9.* Omohyoideus. *10.* Thyreohyoideus. *11.* Hyoid. *12.* Digastric muscle. *13.* Ramus.

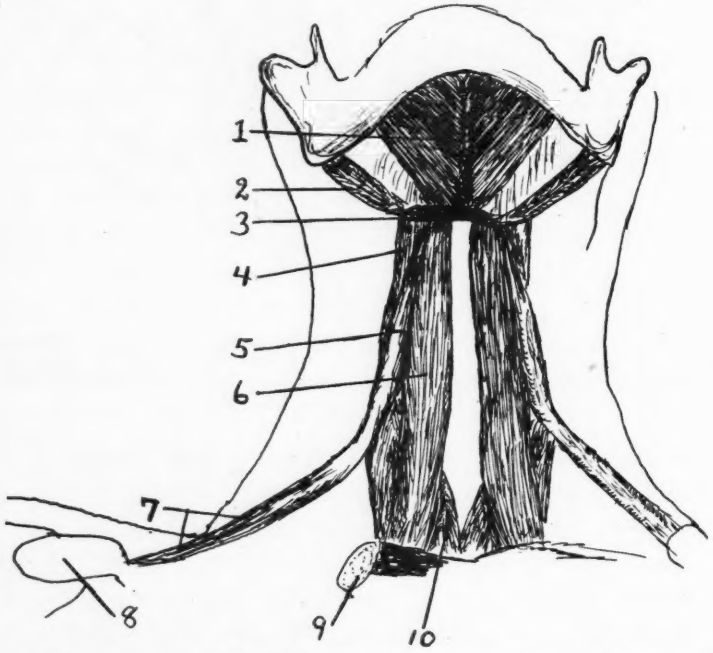


Fig. 11.—*1.* Mylohyoideus. *2.* Stylohyoideus. *3.* Hyoid. *4.* Thyreohyoideus. *5.* Omohyoideus. *6.* Sternohyoideus. *7.* Omohyoideus. *8.* Scapula. *9.* Clavicle. *10.* Sternothyreoideus.

general direction of the fibers are downward and inward. The muscle raises the floor of the mouth and when the mandible is fixed, elevates the hyoid and

draws it forward. When the hyoid bone is fixed, it depresses the mandible. The nerve supply is the mylohyoid branch of the fifth.

Fig. 13 shows the manner in which the sternothyroid arises from the sternum and is inserted into the thyroid cartilage, the action of which is to depress the thyroid cartilage. This muscle is also a depressor of the thyroid bone and as such, also becomes a depressor of the mandible by the extension of the thyro-hyoid from the thyroid cartilage to the hyoid bone. Fig. 13 shows what might be called the deeper layers of muscles in the hyoid region, but also concerned as depressors of the mandible. Fig. 14 is made to show the arrangement and direction of the fibers of the mylohyoid and the geniohyoid from the mandible to the hyoid bone. These muscles also form the floor of the mouth and are influential in mouth-breathing.

Figs. 15 and 16 show the ligaments associated with the mandible, the purpose of which is to limit the extent of the mandibular movement as the result

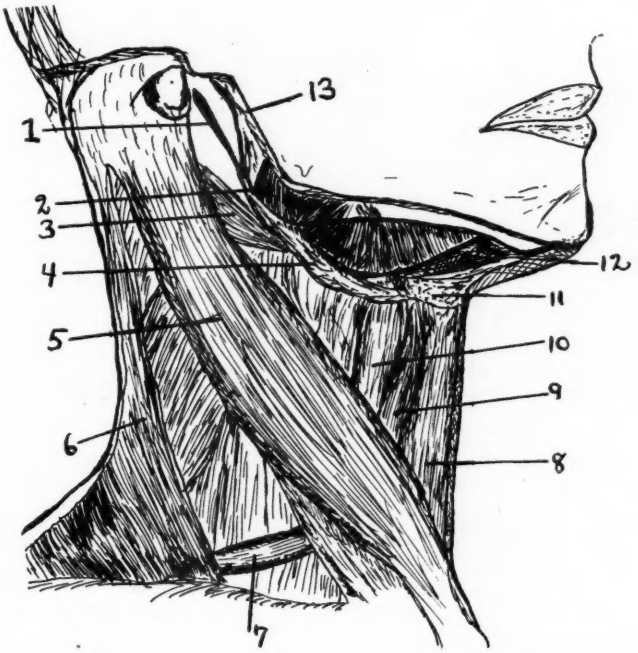


Fig. 12.—*1.* Mastoid process. *2.* Digastric muscle. *3.* Splenius capitus. *4.* Stylohyoideus. *5.* Longus capitus. *6.* Constrictor pharangeus inferior. *7.* Omohyoideus. *8.* Sternohyoideus. *9.* Omohyoideus. *10.* Sternohyoideus. *11.* Thyreohyoideus. *12.* Hyoid. *13.* Digastric muscle, anterior belly. *14.* Loop for digastric muscle. *15.* Masseter. *16.* Styloid process.

of the action of the various muscles. Fig. 15 shows the temporomandibular ligament or what is often called the external capsular ligament which is attached into the outer border of the glenoid fossa and inserted into the neck of the condyle below the articular cartilage. It completely surrounds the head of the condyle, attached to all sides of the glenoid fossa. The outer fibers are the stronger, the majority of which run downward and backward. This ligament limits the forward movement of the mandible as a result from the action of the external and internal pterygoids, and also limits the lateral movement of the mandible on the right side when the pterygoid muscle on the left side are contracting alone to shift the mandible laterally. When the posterior fibers

of the temporals contract or when the lower fibers of the temporal act during the act of incision after the mandible has been moved forward to place the edge of the incisors together, these fibers of this ligament also limit the backward action of the lower fibers of the temporal. Owing to the direction in which the stylomandibular and sphenomandibular ligaments run downward and forward, as the mandible is protruded by the action of the pterygoids there is necessarily a tendency for the condyle to move upward as these ligaments assume a different angle. When the mouth is opened to its extreme width by the action of the depressors of the mandible which include the anterior belly of the digastric, the geniohyoid and the mylohyoid; the mandible first starts

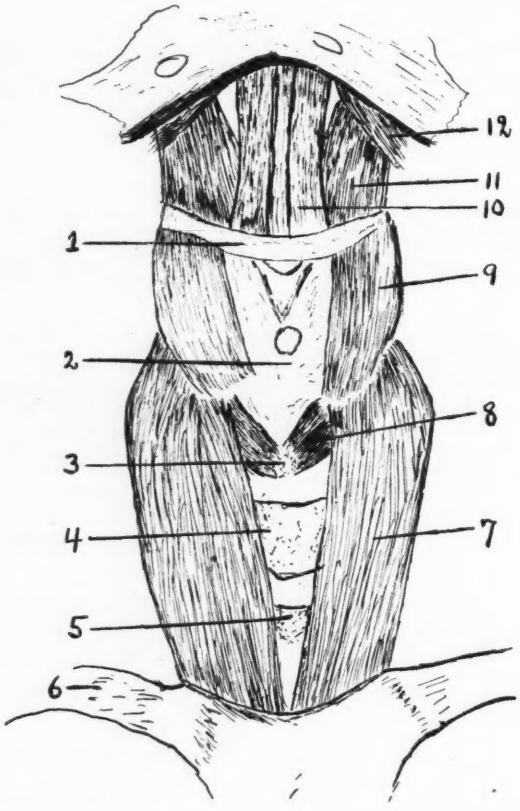


Fig. 13.—*1.* Os hyoidei. *2.* Thyroid cartilage. *3.* Cut cricoidea. *4.* Thyroid gland. *5.* Trachea. *6.* Clavicle. *7.* Sternothyroid. *8.* Cricothyreoideus. *9.* Thyreohyoideus. *10.* Geniohyoideus. *11.* Hyoglossus. *12.* Styloglossus.

to open with the temporomandibular articulation as the hinge point after the stylomandibular and sphenomandibular ligaments become tight: then the opening movement of the mandible is continued by the attachment of the stylomandibular and sphenomandibular ligaments on the mandible becoming a limiting point. The condyle then moves forward as far as allowed to by the temporomandibular ligaments, at which point the opening of the mouth is stopped.

We have called attention to the different groups of muscles attached to the mandible, of which there is a group of four, all of which are concerned in the acts of mastication. The group of four is located in the suprahyoid region, three of which are depressors of the mandible and one of which is only an

elevator of the hyoid bone; namely, the stylohyoid. We have four infrahyoid muscles which connect the hyoid bone to the suprahyoid region and depress the mandible, two of those muscles extending from the sternoclavicular region to the hyoid bone, one extending from the thyroid cartilage to the hyoid bone, which, however, becomes a depressor of the hyoid, owing to the fact that the fourth muscle in the group extends from the sternum to the thyroid cartilage. The four muscles of mastication, which are supplied by the fifth nerve and are attached to the ramus, are the least affected by maldevelopment or environmental changes and conditions. Of the various types of malocclusion that we encounter, with over- and underdevelopment of the mandible, we find that region to which the muscles of mastication are attached more often normally developed than any other part of the mandible. The action of the muscles of mastication is nearly always normal, in fact they are always normal in regard to the direction, but

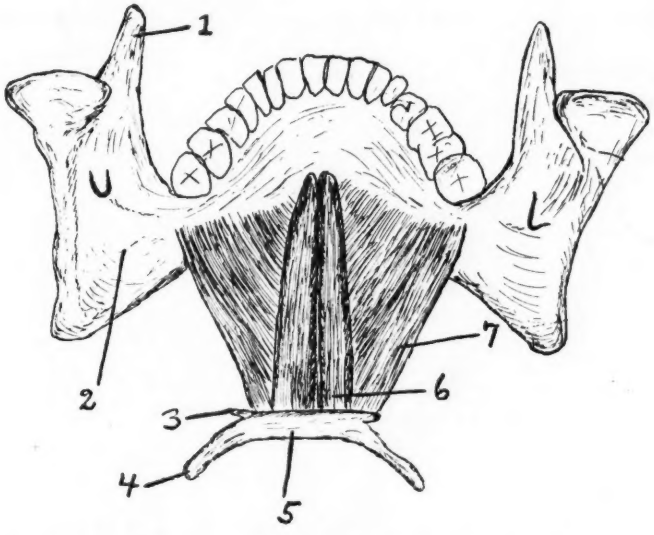


Fig. 14.—*1.* Coronoid. *2.* Ramus mandibulæ. *3.* Cornua minora. *4.* Cornua majora. *5.* Hyoid. *6.* Geniohyoideus. *7.* Mylohyoideus.

they may not exert as much pressure as is desired in certain types of malocclusion. The muscles of mastication have long been accused of producing deformity of the mandible in rachitic individuals, which statement has been doubted by Dr. Hatfield.[2] The writer is still of the opinion that mandibular deformity in rickets does occur from the action of the mandibular muscles. Hatfield contradicts the theory upon the basis that physiologic use of an organ tends to produce normal development, therefore the action of the muscles of mastication would tend to produce a normal development of the mandible. This theory would be true if Hatfield did not forget that in rickets there is a pathologic condition of the mandible in extreme cases, which results in an abnormal development or a failure of response to the mechanical stimulation such as would obtain in a normal individual. Consequently with the mandible in an imperfectly calcified state and the individual attempting to masticate on the teeth, we find the mandible assumes an obtuse angle between the ramus and the body.

Rogers has also stated that the pterygoid muscles should be exercised in

distoclusal cases with the idea of moving the mandible forward. This theory is open to criticism upon the grounds that it must first be proved that in distoclusion cases the mandible needs to be moved forward. In other words, if a distoclusion case is a result of posterior position of the condyle in the glenoid fossa, then the action of the pterygoids in moving the mandible forward would be a desirable condition. But, it must be further remembered that muscular action does not hold the mandible in position; so, no permanent results could be expected from the action of the pterygoids in keeping the mandible in a new position. The mandible is held in position by the force of the inclined plane and the atmospheric relations, not by muscular activity. The beneficial results which occur from the exercising of muscles in cases of malocclusion do not result from the fact that the muscles hold the mandible in position, but the use of these muscles simply create physiologic growth and development which becomes beneficial through the inclined planes of the teeth performing the functions in their proper positions. Rogers has recognized this factor because he states that in no disto-

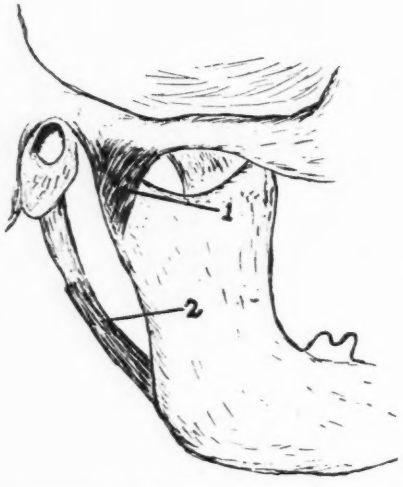


Fig. 15.—*1.* Temporomandibular ligament. *2.* Stylomandibular ligament.

clusion case should exercise of the masseter and the temporal be employed until the cusps of the teeth are in proper position. As a result of this muscular exercise, instead of the mandible assuming a different position, it produces a growth and development which overcomes the deformity and thereby gives a beneficial result which Rogers seems to think has been obtained by changing the position of the mandible.

The muscles most concerned in the direct movement of the mandible are the four muscles of mastication; namely, the external and internal pterygoid and the temporal and masseter. The various movements which these muscles are capable of producing upon the mandible can be analyzed by remembering that the external pterygoid running from the external pterygoid plate to the head of the condyle (Figs. 6, 7, and 8) moves the mandible forward, and also provides for a lateral motion. When the right and left external pterygoid acts jointly, the mandible is protruded and the incisal edge of the incisors is placed in position. The mandible is then guided to a position of rest by the cusps of the teeth as the

result of the action of the lower fibers of the temporal muscles. By a careful study of the lower fibers of the temporal muscles and the direction of the fibers of the external pterygoid, it will be found that those muscular fibers run practically parallel to each other, or rather run in a parallel direction. The fibers of the external pterygoid run from the external pterygoid plate backward and outward to the neck of the condyle, and the lower fibers of the temporal run forward and inward on practically the same plane to the coronoid process. We may then say that the lower fibers of the temporal have a directly opposite action to the fibers of the external pterygoid. If the pterygoid on the right side act, the mandible is swung to the left and is brought back into position by the reverse action of the right temporal muscle, especially of the lower fibers. The masseter and internal pterygoid are useful in closing the mouth or bringing the teeth to occlusion when the teeth have been separated by the action of the anterior belly of the digastric and the geniohyoid. Fig. 4 shows the general direction of the fibers of

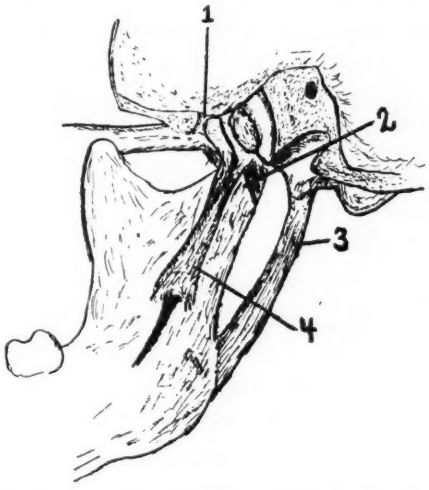


Fig. 16.—*1.* Temporomandibular ligament. *2.* Temporomaxillary ligament. *3.* Stylomandibular ligament. *4.* Sphenomandibular ligament.

the masseter extending from the zygomatic arch downward to the lower border of the ramus. Figs. 9 and 10 show the direction of the anterior belly of the digastric from the hyoid bone to the base of the mandible, which is downward and backward from the mandible and very nearly parallel to the direction of the fibers of the masseter and internal pterygoid. It is the anterior fibers of the mylohyoid which are the most functional in opening the mouth. The geniohyoid is shown in Figs. 13 and 14 and also runs parallel to the anterior belly of the digastric and it may be considered that these three muscles, the mylohyoid, the geniohyoid and the anterior belly of the digastric are directly concerned in opening the mouth and work in an opposite direction to the temporal, the masseter and internal pterygoid. This belief is further strengthened when you consider that the four muscles of mastication attached to the ramus are supplied by the fifth nerve, and also those three of the suprahyoid group; namely, the mylohyoid, the geniohyoid and the anterior belly of the digastric are supplied by the mylohyoid branch of the fifth nerve. This group therefore may be considered depressors of the

mandible more than elevators of the hyoid, because they are supplied by the mandibular nerve.

Attention should also be called again to Figs. 15 and 16, which show the attachment of the three ligaments of the mandible which limits its various movements. It must also be remembered that the action of the muscles in mastication, as well as the muscles of expression, on the mandible, the teeth, and the supporting structures is that of stimulating physiologic development. The limitation of the movement of the mandible is governed by the ligaments, the temporomandibular, the stylomandibular and the sphenomandibular. When at rest the position of the mandible depends upon the occlusion of the teeth, upon the inclined plane of the teeth, and atmospheric conditions. As a result of the second statement, we have the solution of the beneficial results which have occurred in muscle training as outlined by Rogers, for the cusps of the teeth have been brought into play by the muscular action, which has resulted in the development of the parts supporting the teeth, and the mandible has assumed a certain relation because the cusps have been arranged to make that position possible; and, secondly, that position has been made permanent because the exercise of the muscles of expression has established the force of occlusion known as harmony in muscular action and atmospheric pressure. This harmony in muscular action has no influence upon holding the mandible, but simply of maintaining the buccolingual diameters of the dental arches as a result of the action of the tongue and the muscles of expression.

Rogers has likened the pterygoid muscles, especially the external pterygoid (which is the principal one to move the mandible forward) as the elastic rubbers of nature. This statement, while to a certain extent correct, is liable to misinterpretation, because the action of the external pterygoid does not produce such a movement as we hope to get with intermaxillary rubbers. If we admitted that in treating distoclusion cases we move the mandible forward instead of developing the body of the mandible, and that our results depend upon holding that mandible forward, then Rogers' statement would not be so liable to misinterpretation, but it would still be faulty. In the beneficial results which he cites in distoclusion cases where he has expanded the maxillary arch, and by the action of the external pterygoids placed the teeth in their proper position, those mandibles are not held in that position by the pterygoids. He follows the action of the external pterygoids in moving the mandible forward, by exercise of the masseter, internal pterygoid and perpendicular fibers of the temporals; which being attached to the ramus pull the cusps of the teeth into position, and stimulates growth of the body of the mandible in such a manner that the body of the mandible lengthens until a harmonious condition is again produced between the ligament holding the mandible in the region of the condyle and the cusps of the teeth.

In studying the musculatures of the mandible, one must consider the various groups of muscles and their nerve supply, and as a result of the knowledge of occlusion will arrive at the following conclusion: First, that various groups of muscles have certain movements which are again counteracted by other groups of muscles. Second, the mandible is not held in position by the muscles of mastication, but by the cusps of the teeth, atmospheric pressure, and muscular

harmony. Third, the limitations of the various movements of the mandible when the cusps of the teeth are separated is limited by the mandibular ligaments. The forces of occlusion, namely, the inclined plane of the teeth, harmony in the size of the arch, atmospheric pressure, and muscular pressure (and by muscular pressure we mean the pressure of the muscles of expression and the tongue) maintain the shape of the arches and the inclined plane and atmospheric pressure, when the other forces of occlusion are normal, hold the mandible in a definite position.

REFERENCES

[1]Rogers, A. P.: The Development of Occlusion, Jour. Allied Dental Societies, March, 1918. Muscle Training and Its Relation to Orthodontia, Internat. Jour. Orthodontia and Oral Surg., November, 1918, iv, No. 11.

[2]Hatfield, Hugh K.: A Preliminary Study of the Effect of Rickets on the Jaws, Internat. Jour. Orthodontia and Oral Surg., July, 1919, v. No. 7.

PREVENTION VS. TREATMENT OF MALOCCLUSION*

By S. Lewis Kregarman, D.D.S., Newark, N. J.

IT IS not the good fortune of every essayist to present a paper essentially new in its interpretation of the questions involved. However, as long as there remains a need for reiteration of principles that are conducive to the public health and welfare, the essayist may be pardoned for a discourse that presents theories previously advanced by others.

Even though the movement for the general principles of prevention are progressing with unusual momentum, there is still evidence, here and there, of instances where propaganda is most necessary. Even in this age of our enlightened, boastful human intelligence, we do not fully appreciate the import of the word PREVENTION. Our knowledge and application of its true meaning is woefully lacking. When, however, it has become a part of the common mind of all the people, the present day neglect will appear extravagantly wasteful and crude.

It is assuredly the opinion of all present that in things pertaining to medicine or dentistry prevention is preferable to cure, for such is the true professional spirit. However, as incomprehensible as it may seem and contrary to the well-established beliefs of prevention in all other things, there is yet the opinion prevalent among many professional men of good training, high standing, and unquestionable ability, that when a malocclusion presents itself, if the patient be under twelve years of age to advise to "wait until all the permanent teeth are erupted and then have it attended to." How such opinions could have become the honest belief of these men is difficult of understanding, for I can not find any of the standard textbooks advocating such procedure. To quote, Angle says:

"The author is more and more impressed with the advisability of beginning the treatment as soon as the malocclusion is manifest. * * * Unless some unusual physical condition of the patient exists, it is unquestionably a serious mistake, and without the least argument in its favor, to defer the operation until the teeth have erupted, a time-honored custom still often advocated and followed by dentists."

Vernon Fiske says: "If other bones of the child's body are malformed, would you advise that the child wait until he becomes a man before making an effort to have the deformity corrected? Certainly not. Then why wait until the bones of the face are malformed?"

That is the trend of all authoritative advice, so we wonder how the idea, "to wait," became so widely adopted. A quarter of a century ago hardly any corrective measures were instituted in malocclusion except for practically adults. It was not fully realized that "the children of today are the adults of tomorrow," and at that time probably such procedure was excusable. But today, how can men mislead themselves and their patients into the belief that ulti-

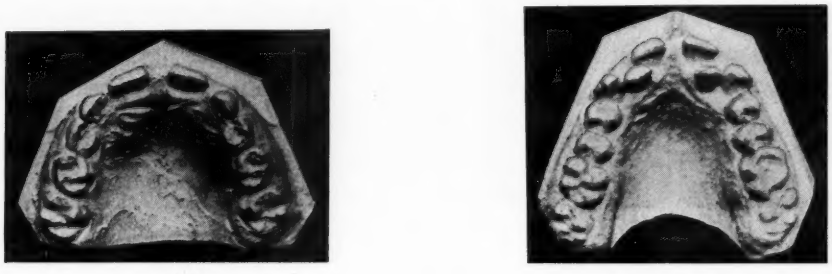
*Read before the Northern Jersey County Dental Societies.

mately a malocclusion will correct itself, or be best treated after fully developed, or that a normal facial expression will obtain no matter at what age the treatment is begun?

In order to contradict such beliefs and dispel forever the continuance of such erroneous advice, educational propaganda must be carried to all the professional men and from them disseminated among the masses. It was not until the tuberculosis societies began propagating educational literature concerning the great white plague that much progress was made in the campaign to stamp out that disease. Does a tuberculosis pamphlet advise people to wait until one lung is gone and then give a lot of instructions and cures? Most emphatically not. The big thing is prevention. The best way to cure tuberculosis is not to get it, and so with malocclusion, the best cure is to prevent it.

So to be consistent it must be our endeavor to exert our influence upon the

Fig. 1.—Showing progressive stages of a developing malocclusion at five, six, and eight years of age. (Young).



A *B*

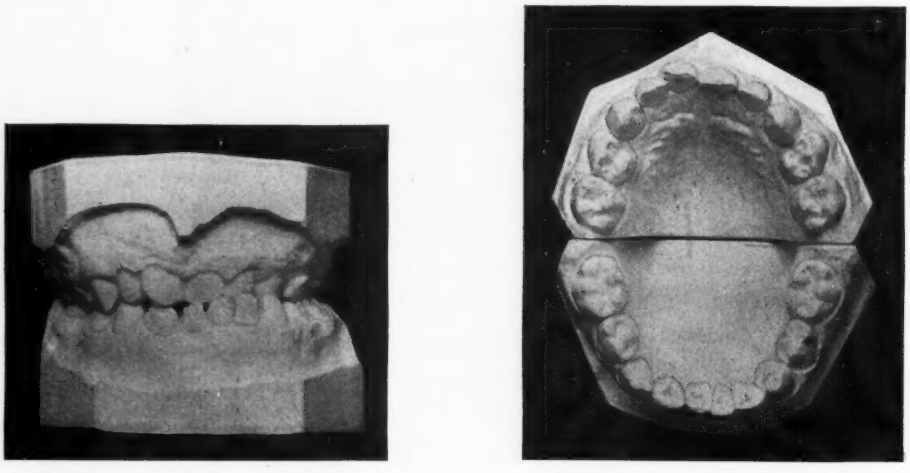
Fig. 2.—Progress from six years of age to twelve years. *A*. Gives every indication of the condition to be expected at twelve. (Lischer).

growth of the child at the earliest possible age. The ideal physical condition of the child is the desire of every mother, and proper cooperation from the dentist toward that goal is welcomed and appreciated by them. One of the first steps we can take would be to educate society against a pernicious habit that is bound to keep recruiting the ranks of children with malocclusion,—bottle-feeding. The disastrous effects that sometimes occur as a result of raising a baby by artificial means is very evident to the observing orthodontist. Hellman and Wenker have found through investigations that 81 per cent of arrested jaw developments are found in the bottle-fed class. Proper feeding and proper dietary conditions in the young are most important to produce a state of normality of bodily function and structure that there is no room left for disease.

All pernicious habits should be detected early and steps taken for their correction. The child should be encouraged to use its teeth, tongue, jaws, and facial muscles in a manner not to deflect them from the channels of normal

growth and development. Thumb-sucking, lip-biting, etc., should be carefully guarded against.

I think probably it is a safe statement to make that there is no one here but would feel a sense of chagrin and great embarrassment, if, after he had treated a patient and dismissed the case as finished, the patient were to say, "Doctor, here is a cavity or two that you overlooked." I say it would be embarrassing. I think we should have an equal sense of embarrassment and feeling of lack of justice done to a child who has been under our care for some time when its parent calls our attention to the fact, "Doctor, I think my child's teeth need straightening." Surely the doctor is just as neglectful of his responsibility to that child as he would be to the other patient whom he was on the point of dismissing with cavities in the teeth. Whether or not the general practitioner ever practices orthodontia, it is essential for his professional reputation that he know the landmarks of normal occlusion and that he be able to recognize a deviation,



A *B*

Fig. 3.—*A*. Crowded condition at five years. No space in the anterior region. Such condition positive to develop into a decided deformity. *B*. Note flattened condition of upper left, also lack of spacing.

or malocclusion, in its very incipiency,—that he guard against the premature loss of the deciduous teeth, and if one must be lost to maintain the space by artificial means to prevent the contraction of the arches,—that he guard against the prolonged retention of the temporary teeth, and guard the first molar from the ravishes of caries from the moment of its eruption until it is safe from decay caused by contact with the too often carious distal surface of the second deciduous molar.

It is true that nothing in nature is absolutely symmetrical,—nutrition, development, and habits govern the final results. When one thinks of the many changes occurring during dentition, and the liability to accident, faulty nutrition, and deforming habits, it is wonderful that nature unaided is so harmonious.

It is also true that, except in rare occasions, we find the individual who is blessed with the combination of health, beauty, and happiness. Among the many inborn rights of children are the rights to be, first, as healthy, and, second, as beautiful as nature and nurture will allow. These rights are as inalienable as

the right to be happy. Every mother desires such a combination for her child and would make any sacrifice that would lead to the consummation of this ideal. Certainly, the dentist can be of material assistance in regulating the physical and mental growth of every child that comes under his attention. By care and watchfulness the dentist can serve as the means of producing proper occlusion and consequently the possibility of better mastication, proper development of facial bones, and production of facial harmony, proper breathing with the attendant improved bodily development, the discontinuation of faulty and pernicious habits with the substitution of proper control and development of the facial muscles and a stimulation to increased mental activity.

First and foremost from a purely dental standpoint is the grave importance of normal occlusion. The law that, "the best balance, the best harmony, the best proportions of the mouth in its relations to the other features require that there shall be a full complement of teeth and that each tooth shall be made to occupy its normal position," is practically unanimously accepted by the orthodontists of today. The fallacious theory of "extraction to make room" was equally as harmful as the idea of waiting, and is very readily being discarded.

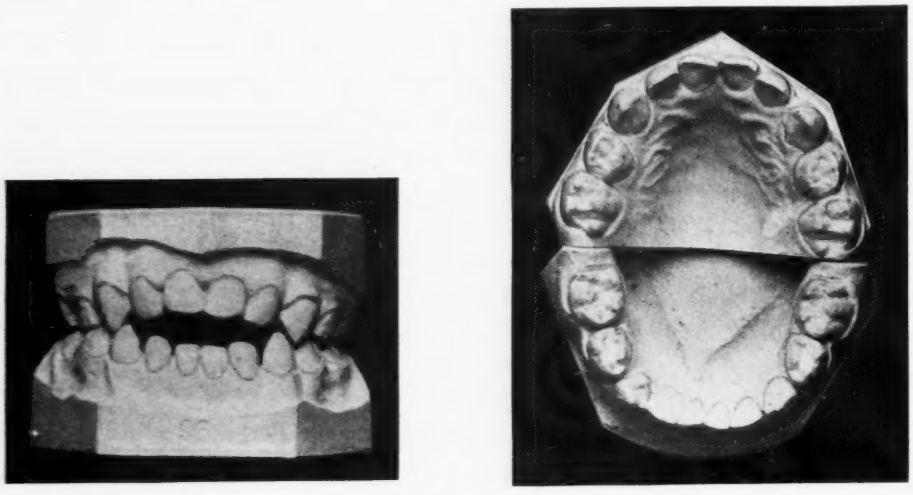
The position of each tooth and its occlusal relationship should be considered in other than an orthodontic significance by the dentist. Occlusion, although originally serving only as the basis of orthodontia, is now becoming recognized as the basis of all dentistry. As every tooth in each jaw is opposed by two approximating teeth in the other jaw, with the exception of the lower centrals and the upper third molars, if one is functionally disabled, it will similarly involve its antagonists. It is consequently quite plain that although one tooth constitutes a thirty-second part of the human adult denture so far as number is concerned, it represents a far greater quantity when its functional value is considered. As so aptly stated by Hellman, "The absence of a tooth breaks up the continuity in the series of elevations and depressions in the grinding plane of the denture and destroys the mutual support derived by the approximating contact, it also tends to allow displacement, or migration of the adjacent teeth and thereby further decrease functional efficiency."

Dr. Forest Orton, authority on crown and bridge work, recently stated that he considered occlusion the most important feature of that branch of dentistry, and holds that faulty occlusion is the cause of undermining an immense percentage of bridges. Periodontists are laying much stress upon the treatment of "traumatic occlusion" as being an important incident in insuring the proper coordination in function of the dental organs. That injuries to the alveolar process and to the attachment of the teeth are being produced as a result of irregular alignment and improper balance of stress is a question beyond argument, consequently that which naturally arises is the question whether or not the profession will persist in permitting such abnormalities to progress until these pathologic conditions are made more possible.

Still, at this point, it must be added, that normal occlusion with all its importance as a local factor, should be but a mere incident in outlining the plan of our treatment. The normal development of all the structures of the face, the nose, the jaw, the mouth, the teeth, muscles of mastication, muscles of expression,—all these form the true basis of orthodontia of today and all our diagnoses, all

our classifications, all our treatment and retention is based upon our knowledge of this much greater foundation.

It is very gratifying to note how both the rhinologists and orthodontists are realizing the importance of the diagnosis of adenoids and abnormal tonsils as an aid in preventive orthodontia. It is evident that it would be futile for us to zealously attempt corrective treatment of any case and neglect any one step that is necessary for success. Consequently the sooner we learn that no matter how much spreading of the arches we obtain, if the obstruction is allowed to remain in the postnasal region, our efforts are nil, and the rhinologist must learn that even though he remove the adenoids, if the development be already arrested in the maxillæ, the mouth-breathing condition will continue, unless orthodontic interference is begun. Certainly it is not necessary to draw the picture of a mouth-breather and dwell upon its pernicious effects. Suffice to say, defective breathing produces underdeveloped nasal passages, enlarged turbinates, deflected



A *B*

Fig. 4-*A*.—Thumb and tongue sucking at three years. A positive indication of a future open-bite malocclusion unless prevented.

Fig. 4-*B*.—Occlusal view.

septum, maldevelopment of the face and entire body, a lowered vitality, in general a bearing down of the physical and mental forces of a child who might grow splendidly to a perfect fulfillment of his or her highest possibilities. Is it not then to be considered as a sacred privilege that within our realm of endeavor it is possible for us to spare children the evils that are positively in store for them unless our treatment is begun at the proper period? The question is, should we wait until we are positive the condition exists with all its damning evidence, or should we be capable of recognizing the menacing deformity years in advance of its climax?

The esthetic phase is by no means the most important, still it has been very tersely remarked that the outside of the face is the "mirror of the soul." It is now a recognized principle that the shape of the face depends on the second dentition. At birth we have very little face in comparision with the rest of the

head. This develops afterwards and does not reach its full development until about twenty. A slight deformity of any portion during its growth is likely to throw the other parts of the face out of line. Defects and faults are apt to enlarge with development and become less easily corrigible. Until the age of six the growth has been mainly in the cranial region but at this period the growth of the accessory sinuses begins, the nasal fossæ increase in height and the alveolar arches also enlarge. The face develops. It is dependent upon the size, shape, and location of the teeth to develop a harmonious composite facial form. The

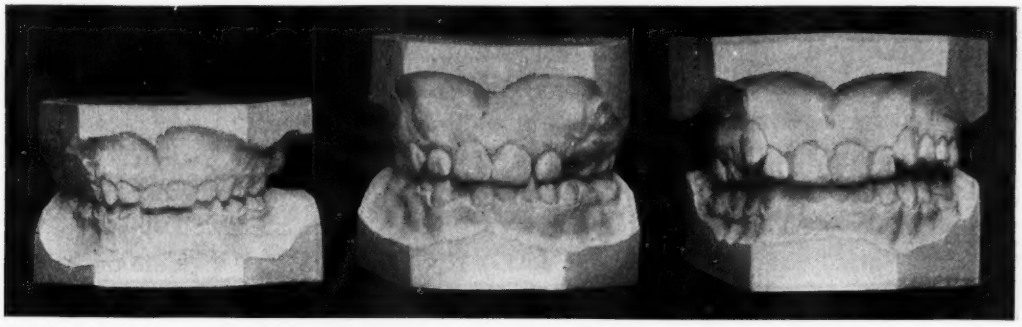


Fig. 5-A.—Progressive stages at six, nine and twelve years. (Ferris.)

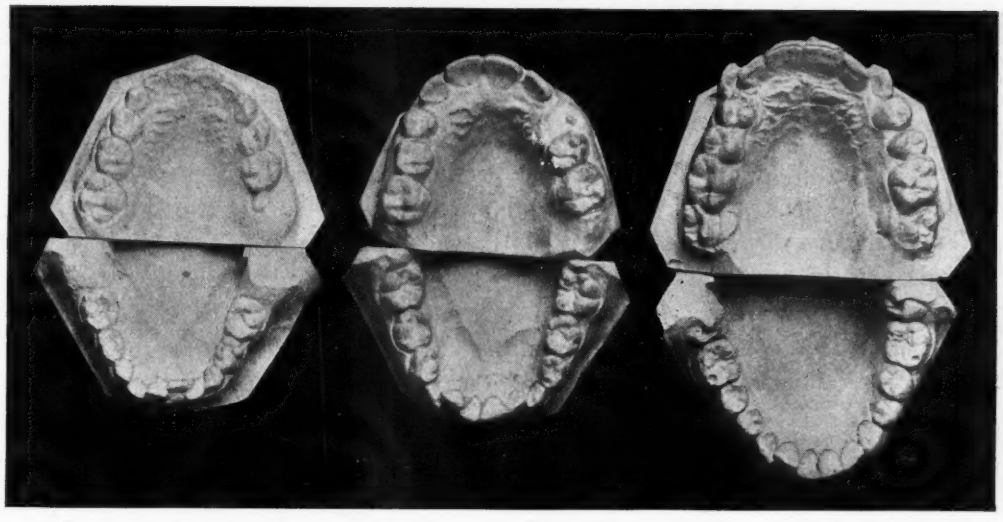


Fig. 5-B.—The condition at twelve should be expected when a crowded arch, as first figure represents itself at six. Malocclusion is always progressive.

alveolar process has no definition in life other than to serve as a passive shell and necessary support of the teeth. When any of the teeth are lost, in youth or in old age, the alveolar process at the spot or area where such a loss has occurred enters immediately upon the road of involution and complete disappearance. Without the teeth it does not develop, and when the teeth are lost, it disappears.

Singleton says: "Down the avenue they are selling false faces. How many people need to buy them? There are more real live false faces on the street than artificial ones in the store. How does anybody know? Look at their teeth. Does not the contour of the face depend on the bony framework that gives it

support and does not this underlying structure consist of the teeth and those parts necessary for their maintenance? People aren't born with false faces, but get them after they grow up and growing up with a motley array of human teeth in the mouth puts a cartoon on your shoulder instead of your natural face. Consequently every child with a malposed tooth is nursing the germ for his or her future cartoon, which will probably serve as a conspicuous credential in the struggle for existence."

Thus we see that bad habits, faulty development, obstruction, improper occlusion, and the development of a caricature for human features, can be avoided in the beginning. With no preceding teeth to influence it, the deciduous denture in the healthy child is usually regular in alignment and occlusion. However, should there be, from any cause, an irregularity in this denture, it is becoming more generally recognized, treatment should be instituted in the deciduous set as early as the age of the patient will permit the wearing of the delicate arches and bands. To those who cling to the doctrine to wait, this opinion may seem revolutionary or bolshevistic, but still it is very good practice.

It assuredly should be evident to one, not even versed in histology, how much more preferable it is to guide an erupting tooth into its proper alignment than to wait until a maldevelopment has been allowed to become fixed before attempting a correction. There is no attachment of the pericemental fibers to the enamel surface of the tooth and since the crown of the erupting tooth makes its appearance before the root is fully formed, it must be very evident that the pressure required to stimulate the cell activity necessary for the proper placement of such a tooth is much less than that required in a condition where the tooth was fully erupted, with surrounding bony formation fully developed. During the eruptive period much less pressure being necessary, more delicate appliances can be used, in fact, such delicate appliances that the little children suffer no inconvenience whatsoever. If the teeth are "guided" into their sockets, it tends greatly to eliminate the wholesome fear that men have for retention, for certainly establishing the normal relationship of the inclined planes with their antagonists as the original, or natural relationship, we eliminate the possibility of any "backward tendency" of those teeth to any abnormal position, since such a condition was never permitted to exist. Whereas, if treatment is begun on malposed teeth after the sockets are fully formed, the retention of those teeth after correction is one of the greatest problems facing the orthodontist today. Another item to be considered is the comparison of the physiologic strength of originally formed bone with that which is developed through stimulation. Dr. Young is of the opinion that teeth guided into position are surrounded with bone far more normal in cell activity and structure and therefore better able to withstand the invasions of disease, than where resorption of bone has been induced by mechanical means and the teeth held by some device until new bone has developed to sustain them."

An important bit of knowledge that all general practitioners should be occasionally reminded of, is that the child whose general development is normal will always show very slight spacing between the anterior teeth, at about 4 and 4½ years of age and then progress rapidly enough to provide the necessary room for the larger permanent teeth. If, however, a child's general develop-

ment is slower than the average, the spacing occurs at a corespondingly later time. The point to be made clear is that if the jaw development is clearly slower than the general development, and no spaces occur in the anterior region, one may invariably look for a malocclusion to result, unless interference is begun early.

We do not intend dwelling at length on methods of treatment. Children have no objection to wearing the improved appliances of today. This day of enlightenment in the science of orthodontia finds us all a unit in the belief that almost any infinitesimal force will move a tooth, consequently the use of light and delicate appliances. The simple lingual arches advocated by Dr. Lourie and Dr. Mershon, used in conjunction with the high labial arch are so delicate in construction that the tender age of the child does not enter into consideration. An importance hitherto unrecognized, but due to Dr. Roger's study is now attached to the proper balancing of the muscular forces of the lips, jaws, and neck and a most valuable adjunct to treatment is a series of systematic muscular exercises that are at times more effective than appliances.

In conclusion, we find that orthodontia is a prophylactic power in its bearing upon the prevention and correction of abnormalities of the face, mouth, and nasal cavities, and the respiratory, digestive and nervous systems. Children, the sufferers, are mentally and physically below standard. If not entirely prevented, these conditions should be recognized in their incipiency and diverted into normal channels before being fully developed, and, that instead of beginning the treatment at the age of eleven or twelve, it is the very time that all cases should be completed.

DENTAL ENGINEERING

By Rudolph S. Hanau, Buffalo, N. Y.

IT IS regretted by the originator of Dental Engineering, that he has been so thoroughly misunderstood in many ways by numerous men in the dental profession.

It is suspected that a set-back has been given to the progress of dental engineering by commercially inclined individuals who have tried to use the same for private gain instead of the advancement of a science. That such men care not for ethics and do not respect science, and in consequence enunciate spurious claims, should not prevent a real searcher from making a most careful investigation. The latter must lay aside all prejudice when making his observations, and he must not forget to fill these gaps which may handicap his analytic reasoning.

Be it understood above all—dental engineering is not presented as a branch of a new religious creed, and therefore, it should not be subjected to *belief*. Furthermore it is not a patent medicine recipe or article, or even a patentable form of archform, determination, or art.

To orthodotists, it should be nothing but knowledge, and when understood, applied science. Orthodontists need dental engineering just as badly as chemists need physics; physicists, mathematics; and engineers, descriptive geometry. Each of the above-mentioned branches of science constitute but a fraction of those which a chemist, physicist, or engineer need, for their respective professions.

Dental engineering is not a substitute for pathology, morphology, anthropology, etc. It should be understood and applied together with these special branches of organized human thought.

An interesting paper by Dr. Hellman* tries to dispose of dental engineering in such a way that the writer of this article takes exception, only because it has many aspects typical of those which dental engineering has to combat. The essay most elegantly circumnavigates the issue, and, strange to say, lands in a common harbor with dental engineering. Dr. Hellman's argument hinges on the following four points:

First: That there is a definite relationship between the size of the teeth and the form of the dental arch.

Second: That by the employment of certain methods of calculation, using the dimensions of the teeth as a basis, a formula, diagram or plan of that form of the dental arch can be obtained in a case of malocclusion which nature would have produced had no interference occurred.

Third: That by following the procedure advanced, uniform success is assured in the treatment of every case of malocclusion.

Fourth: That the propounded methods are universal in their application.

To point one, dental engineering has this to say: *There does exist a relation between the human archform and the size of the teeth. The size and shape*

*Hellman: International Journal of Orthodontia and Oral Surgery, 1919, V, No. 11.

of the teeth are only two of the many factors that are responsible for a set dental arch.

Dental engineering ventures to conclude that the shape of the teeth has a greater influence upon establishing, or maintaining an archform, than the size (mesio-distally) of the teeth, and by reason of the fact that harmony has to be established for the size and shape of the teeth, their kinematic, physiologic, mechanical, and other functions, we are confronted with a problem that is still more complex.

To illustrate this contention, let us consider an apparently normal dentition

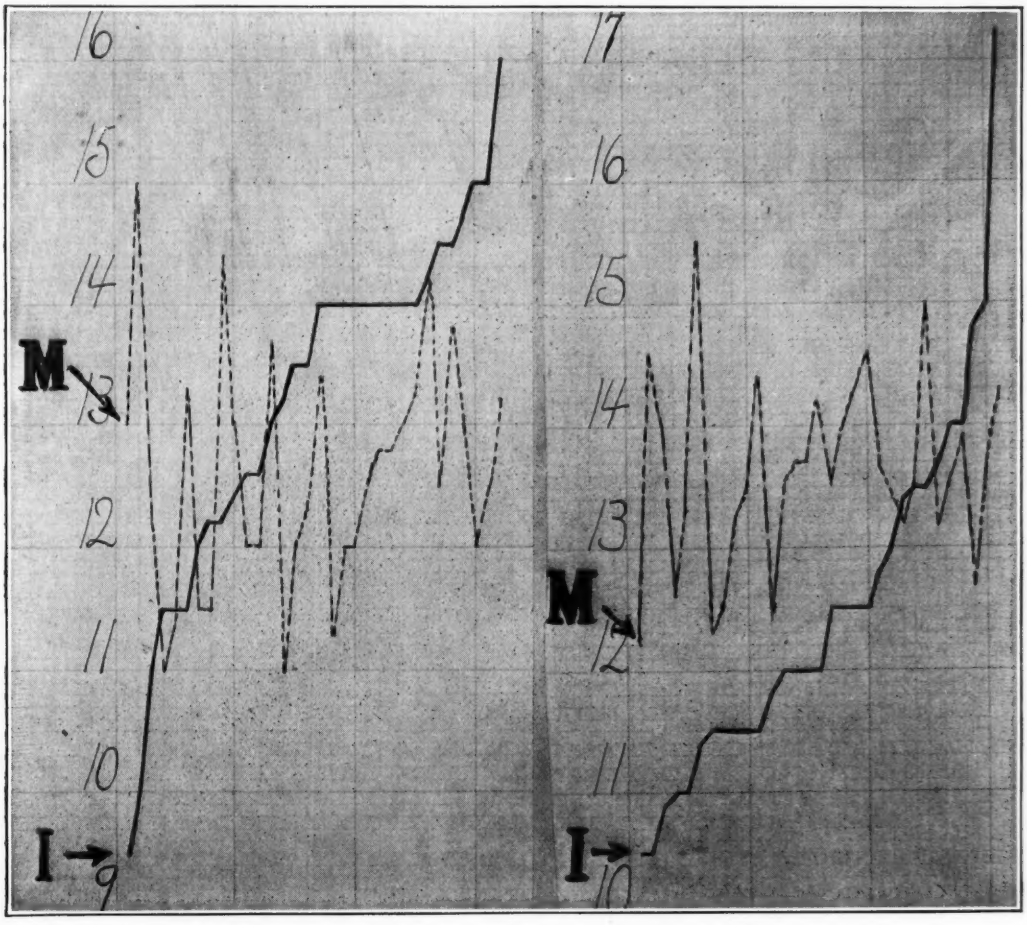


Fig. 1. Fig. 2.

Fig. 1.—Illustrating curves based on the mesio-distal diameter of incisor and molars of the dentitions conforming to one arch outline, showing no correlation in the sizes of these teeth. Heavy line marked *I* indicates incisor curve, broken line marked *M*, molar curve. Numbers indicate dimension in millimeters.

Fig. 2.—Illustrating labio-lingual dimension of the central incisor and bucco-lingual dimension of the first permanent molar as in Fig. 1 showing no correlation. (Markings as in Fig. 1.) (Hellman.)

of a normal individual. For some reason or another, the second premolar crown was removed. If this mutilated tooth were properly rebuilt by tooth material, equivalent in size and shape to that to be replaced, then it will be safe to expect *no change in the arch form.*

On the other hand, should we not substitute the lost crown, then the arch *may retain its form,* thanks to the shape of the teeth, in spite of the loss of

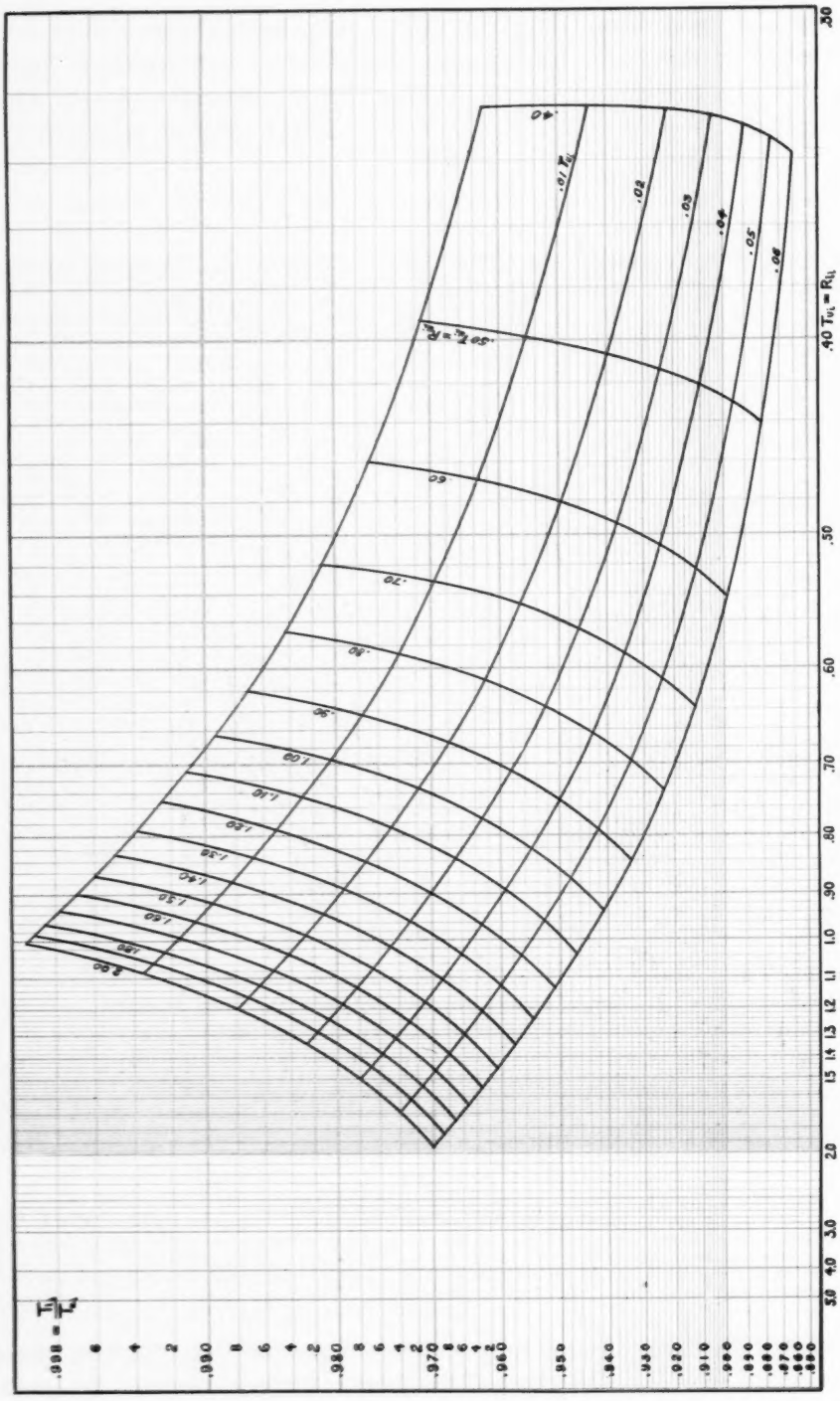


Fig. 3.

tooth material, or, *tooth movement will set in* and malocclusion, or pseudo-occlusion is the result.

But that shape alone or the size alone are not the only components that maintain the archform is evident from the dentition of elderly persons, where we can not find interdigitation due to perfectly flat-worn masticating (occlusal) surfaces. From a purely mechanical viewpoint, it must be expected that a perfectly *flat-worn denture is always in occlusion,* and is more apt to retain such occlusal relation, even when teeth are lost, or tooth movement occurs.

It seems that a great deal of misunderstanding must be attributed to the meaning of "relation." Relation (relatio), or "definite relation," do not necessarily infer proportion, or ratio.

The charts Figs. 3 and 4 of Dr. Hellman's article fully agree with our own findings (Figs. 1 and 2).

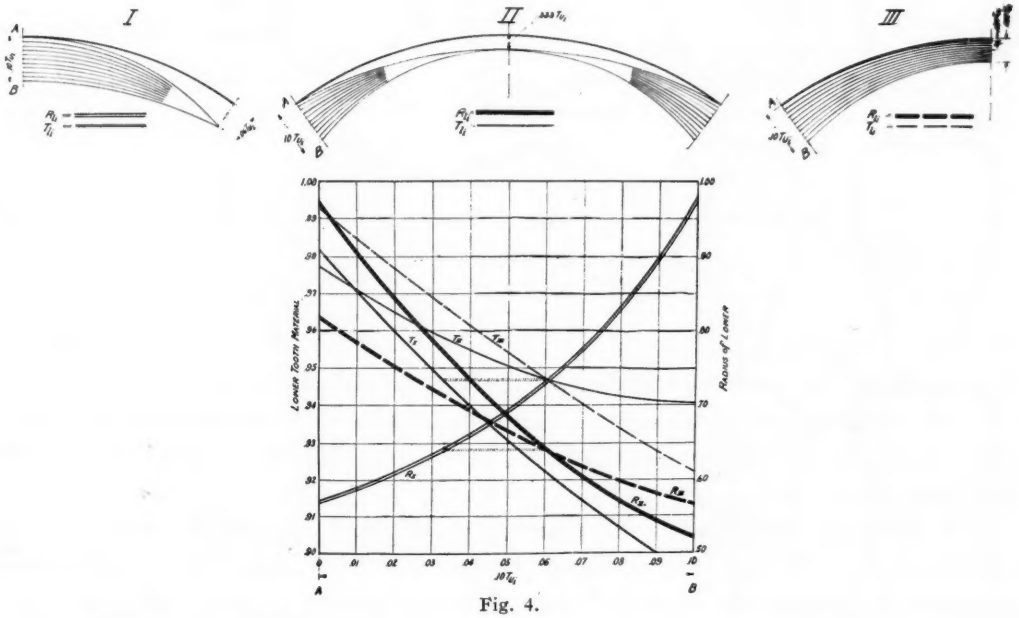


Fig. 4.

The relations that do exist between tooth material and archform, are expressed in Chart 1, (*Fig.* 3). It is up to the orthodontist to show that they do not exist, by producing a denture in occlusion, that does not conform with the mathematical, or better geometrical relation expressed in this chart.

The one assumption that has been made for this chart (and it has only been done for the sake of clearness and simplicity) is a labio-lingual distance (equal to 6 per cent of the upper incisal tooth material) of the compensating contact curves at the cusp of the upper cuspid. The influence of a variation of this distance is shown in Fig. 4 which is Fig. 9 of my paper read in Pittsburgh and published in this Journal, November, 1917, iii, No. 11. A series of charts or even a single chart could be prepared to give this factor consideration.

The accompanying chart gives the "definite relation" that exists between incisal tooth material and the curvature of the incisal portion of the human denture. The same geometrical reasoning may be applied to any other parts of the

human denture, and I am prepared to state that it also applies to anthropoid apes and other animals with *contact tooth formation and known interdigitation.*

The Figs. 5, 6, 7, 8, 9*A*, 9*B*, 15*A* and 15*B* of Dr. Hellman's article illustrate this contention.

The formula for anthropoid apes expressing the upper and lower tooth material beginning at the median line follows for symmetrical dentures:

$$2(C_u+L_u+mE_l+E_u+B^1_u+B^2_u+M^1_u+M^2_u+M^3_u+\cdots)=T_u$$
$$2(C_l+L_l+E_l+B^1_l+B^2_l+M^1_l+M^2_l+M^3_l+\cdots\cdots)=T_l$$

CODE

APPERTAINING TO THE MATHEMATICS OF THE DENTURE

TOOTH	UPPER	LOWER
Central	C_u	C_l
Lateral	L_u	L_l
Cuspid (or Canine)	E_u	E_l
1st Bicuspid (or Premolar)	B^1_u	B^1_l
2nd Bicuspid (or Premolar)	B^2_u	B^2_l
1st Molar	M^1_u	M^1_l
2nd Molar	M^2_u	M^2_l
3rd Molar	M^3_u	M^3_l
Upper Tooth Material	T_u	
Lower " "	T_l	

wherein *m* expresses that portion of the entire lower canine width *m* that has to be considered for contact formation of the upper tooth material.

Dr. Hellman refers to interdigitation peculiarities of the dentures in question. Considering these, analogous laws apply to the denture of anthropoid apes and humans.

I also take exception to the types of arch forms, as well as the mode of classification. For the sake of completeness, I would suggest to consider the following differentiation in arch form: Fig. 5 and then to group the dentures, or parts thereof, in accordance with *the shape of the contact lines, instead of the cusp lines,* which apparently has been done.

The difference in arch form of upper and lower denture has been pointed out. That difference in arch form is an absolute necessity for occlusal contact and is mainly due to the bucco-lingual inclination of teeth. Dissimilarity or irregularity of the incisal portion of the human denture always constitute malocclusion in one form or another. Irregularities in the geometrical relation of the projection of the upper or lower compensating curves unfailingly point out defective occlusion, and if these curves are regular, and the distribution of the tooth material only is abnormal, then the curves represent a case of pseudo-occlusion.

Referring again to Dr. Hellman's four points of which 2, 3, and 4 are not settled, we ask, "Who still claims it?"

The doctor's conclusions from 1 to 10 are in no possible way interfering with or contradicting dental engineering. In fact they substantiate its results,

and give food and encouragement for further development of dental engineering.

Referring to a remark in the discussion by Dr. Dewey, the writer is somewhat embarrassed to mention it. Nevertheless, it may be in order to refer to it for the sake of mutual understanding. There is no excuse for a dental engineer not being able to lay out a denture for a skull or animal of which the laws of occlusion are known, but it must not be expected that the resulting denture resembles the actual denture more closely than our laws of occlusion resemble Nature's actual laws.

The issue condensed is this: either we accept the laws of occlusion, given by our dental authorities as correct, or we have to prove them wrong. Dental

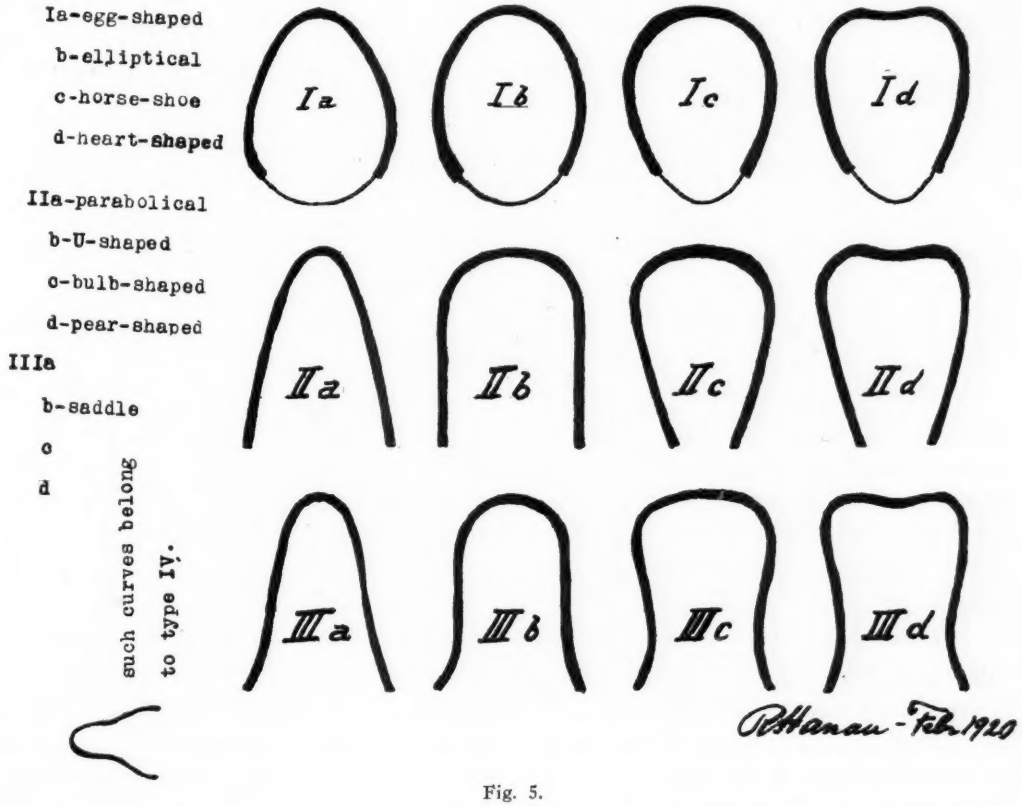


Fig. 5.

engineering accepts them as correct, simply because it could not improve them. Prominent orthodontists evidently believe in them, because they endeavor to apply them.

The open question in my mind is only, how can some orthodontists dare to apply purely geometrical kinematical and mechanical laws or rules, if they admit that they don't know, or don't care to know much about geometry. The laws of occlusion as they stand today are purely geometrical, kinematical, and mechanical, and crude at that.

(*To be continued.*)

DEPARTMENT OF
ORAL SURGERY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of

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DISEASES OF THE JAW—CASE HISTORIES

By Arthur E. Hertzler, M.D., F.A.C.S., Halstead, Kansas

CASE 1.—A veterinary surgeon consulted me because of a swelling of his face.

History.—Fifteen months ago he noticed a swelling in his lower jaw just back of his wisdom tooth. The jaw gradually swelled and became painful. After nine months a sinus formed in the skin just above and behind the angle of the jaw. A few months later a sinus developed an inch lower down the neck. During the past month the temple has swollen markedly and he has severe headaches. He has had no other sickness. He has consulted a number of surgeons who all diagnosed carcinoma.

Examination.—There is an ulcer on the alveolar border extending from the wisdom tooth upon the anterior pillar (Fig. 1). It has an overhanging edge and a granular base. The edge is very firm and feels carcinomatous, but on inspection there is proliferation of epithelium along the edge. The granular base can be made to bleed by manipulation. The bone is exposed at the base. According to his physician this ulcer has not changed in the past year. Because of the pronounced swelling of the jaw he is unable to open his mouth perfectly. The swelling of the cheek and temple is so great that the ear is elevated. The eye is likewise encroached upon. The openings above mentioned are crateriform and puckered with scar-like ridges leading out from them. When the swollen area is pressed upon a liquid pus exudes, carrying with it numerous flakes of a dirty greyish white color. The flakes showed filaments but no club-shaped forms. Some of the pus was injected into a guinea pig.

Diagnosis.—While the crater-like openings were distinctive of actinomycosis, there were no yellow granules. Furthermore the greyish flakes closely resembled those often seen in tuberculous pus. So firmly had the importance of the yellow character of actinomycotic granules been impressed on my mind that

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this disease was excluded on this ground alone. The injected guinea pig died in thirty days and whitish nodules from 2 to 6 mm. in diameter were found on the peritoneum. This was regarded as confirmatory evidence of tuberculosis. It was only after these peritoneal nodules were sectioned that the fallacy was discovered.

Treatment.—General supportive measures were recommended.

After-course.—The head pains increased and he died thirty days after the first examination from a gradually increasing meningeal irritation.

Comment.—The local ulcerous lesion together with the swollen cheek with the puckered crater-like openings was pathognomonic. The fetish of the canary-colored granules prevented me from making a perfectly obvious diagnosis. The presence of the tubercles in the peritoneum made the confusion complete. At

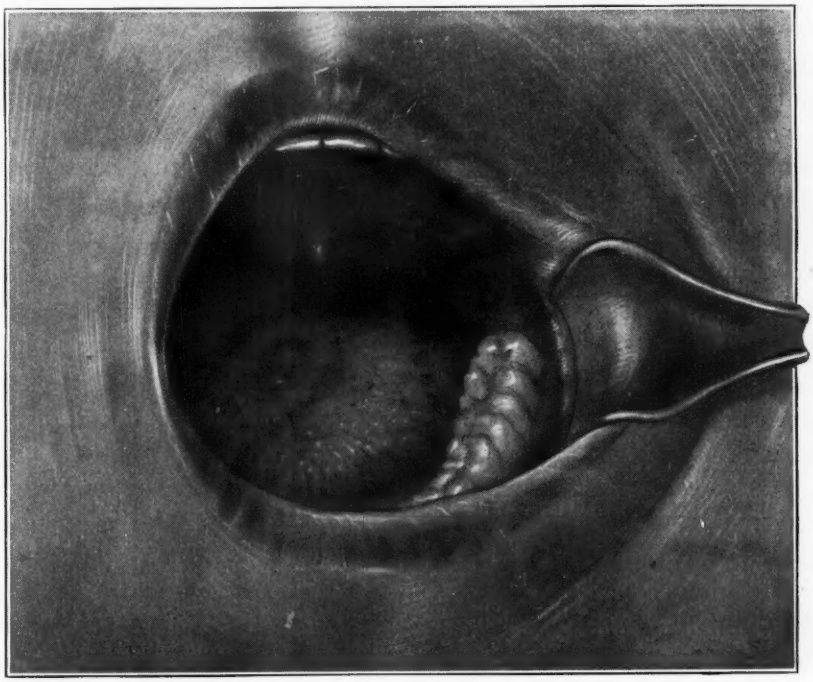


Fig. 1.—Actinomycosis of the jaw. (The artist failed to continue the ulcer down about the wisdom tooth.)

the time this patient was observed none of the inoculation experiments had been recorded in the literature. There are cases recorded identical with this which likewise were mistaken for tuberculosis because of the presence of greyish flocculi and the absence of yellow bodies. Whenever an ulcer of the jaw is accompanied by induration of the cheek, actinomycosis must be thought of, and if puckered crateriform openings are formed, the diagnosis is certain, irrespective of the character of the pus. Massive induration does occur in some carcinomas of the jaw with breaking down and the formation of sinuses, but in these there is no puckering about the opening.

CASE 2.—A man aged fifty came to the hospital because of swelling of the left side of his face, pain and difficulty in opening his mouth.

History.—His trouble started seven years ago when he was struck over the left side of the lower maxillary bone by a mallet used for driving railroad

spikes. Several lower teeth were loosened and he bled from the mouth. The pain never left, but continued to grow worse and after two years he had two teeth extracted from the lower jaw on account of the pain. The dentist said there was necrosed bone about the teeth. An incision was then made over the left side of the lower jaw and the necrosed bone was removed. Three months later when the wound had not healed, he consulted a surgeon who called it carcinoma and said there was nothing to do except to resect the jaw. He consulted another surgeon who agreed with this diagnosis and treated him with radium. The wound healed apparently perfectly after four months of radium treatment.

He had no further trouble until four years later when he had swelling and pain over the left antrum. Two upper teeth began to pain and these were pulled. The dentist at that time said he had antrum trouble. An opening was drilled through the alveolar process into the antrum which was treated by the dentist for a month. The condition did not improve.

Examination.—The patient presents an indurated swelling of the left cheek. It is thickened, indurated, almost hard to the touch and but little painful. It occupies the whole cheek from the zygomatic arch downward to the upper part of the neck. The whole cheek is twice its normal thickness. There is an opening into the antrum above and behind the canine tooth. Exposed spicules of bone present about the opening. There is no pus present. There is no general reaction of any kind.

Diagnosis.—The tissues above indicated presented the general appearance of induration. The necrosed bone seems to be the cause of the chronic irritation. It has all the physical characters of a woody phlegmon.

Treatment.—The exposed bone was removed. It was nowhere separated from the surrounding bone. No noteworthy improvement followed and he returned a year later in much the same condition. A similar incision was made and some dead bone removed from the alveolar process and a portion of the hard palate. The cavity was packed with gauze, which was removed on the same day. No improvement followed. He returned a year later and was operated again. An incision was made straight back from the left corner of the mouth through the cheek. A portion of necrotic upper maxilla was removed and the antrum found filled with a myxomatous looking tissue which was curetted out. The cavity was packed with gauze which was removed on the following day.

Pathology.—It was noted that the bone nowhere showed a disposition to separate from the adjoining unaffected bone. The soft tissues seemed to be separated from the bone, like gums from the teeth in pyorrhea. The tissue gave the general appearance of slowly developing granulation tissue.

After-course.—The wound seemed to heal after the last operation, but it remained painful. The swelling was subsiding up to three weeks ago when it started again. The pain started in the left ear and along the center of the cranium and has been very severe. The swelling and pain have been increasing ever since they began three weeks ago. The pain is steady and present all the time.

The inside of the mouth healed smoothly with nothing to indicate a new growth. The whole left side of the face was swollen like an inflammatory

process. The swelling now extended over the temporal region to the orbit, partly closing the eye to well below the jaw. On the cheek a number of small crater-like openings presented which could be made to expel milkish-white flocculi (Fig. 2). The true diagnosis now dawned on me for the first time. The greyish white nodules were crushed and stained and the characteristic filaments of actinomycosis readily demonstrated. The indurated tissues were then injected with Lugol's solution and the patient was given large doses of potassium iodide. Improvement began at once. The process extended toward the ear, however, and he died six months later of meningeal irritation.

Comment.—It seems hardly possible that so clear a history should have been overlooked even in the hurry of practice. The carious bone following the extraction of the teeth should have indicated the truth. When I first saw him the ulcerous lesion surrounded the area occupied by the teeth, the edge was irregular and dense and bled on manipulation. The feel seemed entirely charac-

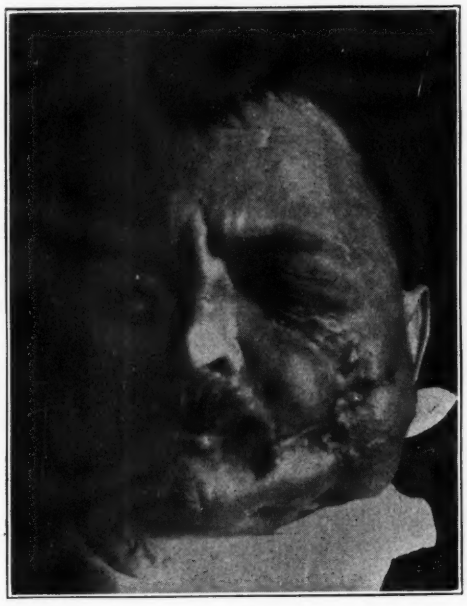


Fig. 2.—Actinomycosis of the jaw, showing the crater-like openings.

teristic of carcinoma. At none of the subsequent operations was any pus of any sort observed, this in the presence of alleged necrotic bone should have pointed the way, particularly since there was no disposition of the exposed bone to separate itself from the unaffected bone. As Wright long ago pointed out, the literature has too much emphasized the yellow color of the granules. In this case, as in the most of those I have seen, the granules were greyish in color. The failure to appreciate this led me into an error many years ago.

Case 3.—A girl aged fourteen was brought to me because of a hard growth on the angle of the jaw.

History.—For several years she noticed a small tumor of the jaw on the external surface just above the angle. It caused no pain, but it was beginning to be obvious to the public gaze. It had been diagnosed as sarcoma and its removal by extensive jaw resection advised.

Examination.—On palpation a hard, smooth mass, free from the soft parts but firmly attached to the jaw bone, is evident. The x-ray shows it to be globular and dense throughout (Fig. 3*A*).

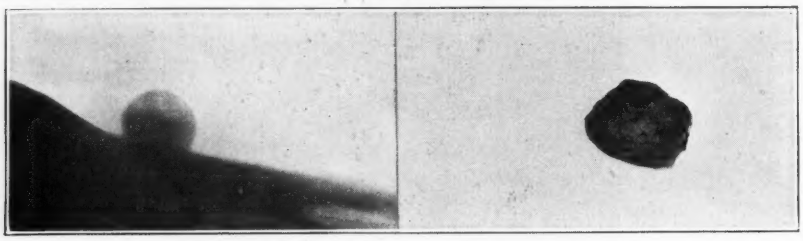
Diagnosis.—Its sharply defined outline and smooth surface shows it to be a simple exostosis, likely a developmental dentigerous rest. Sarcoma can be ruled out because of its smooth surface and constricted base.

Treatment.—An incision long enough to admit a small mastoid chisel was made well under the margin of the jaw. The chisel was introduced and the tumor cracked off at its base. The tumor was then shelled out with the end of a small scissors (Fig. 3*B*).

Pathology.—The tumor was composed of dense bone throughout.

After-course.—The incision after a few weeks was quite invisible.

Comment.—Bony tumors with constricted bases are presumably benign, and before disfiguring operations are done for their removal, all factors in connection with them should be intelligently reviewed. These dentigerous outgrowths occur most frequently on the oral surface of the jaw.



A *B*

Fig. 3.—Exostosis of the lower jaw. *A*. As seen by the x-ray. *B*. As it appeared after removal.

CASE 4.—A student aged thirty sought advice because of a bony prominence on his lower jaw.

History.—For as long as he can remember he has noted a hard prominence projecting from the inner side of the lower jaw toward the tongue. It has not grown and, aside from its presence, causes no disability.

Examination.—A small nodule the size of a hazelnut kernel projects inwards at the level of the second molar tooth (Fig. 4). It is smooth, possesses a covering of mucous membrane, and is extremely dense to the touch. He has the normal number of teeth.

Diagnosis.—Odontoid exostosis. Its long duration and fixicity to the jaw bone distinguishes it from other bony outgrowths.

Treatment.—It was removed with a small chisel.

After-course.—Recovery has been complete.

Comment.—Sometimes simple exostosis occurs about the jaw but these are usually on the outer surface.

CASE 5.—A farmer aged thirty-four came for relief from thickened gums.

History.—For a number of years the patient has noticed that his gums were becoming thicker. At first the disturbance was slight, but for a year or more mastication has been seriously interfered with. His general health is good.

Examination.—Three teeth are absent on the right side and those on the

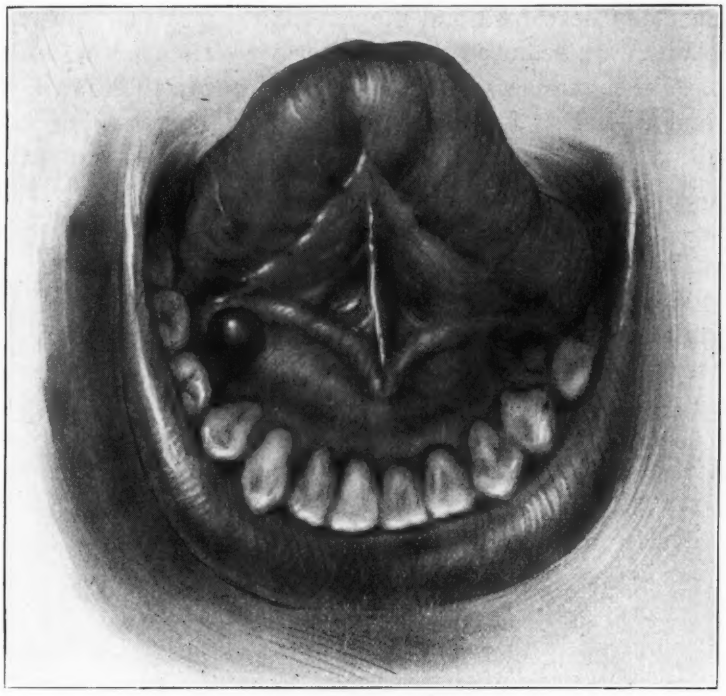


Fig. 4.—Odontoid exostoses of the lower jaw.

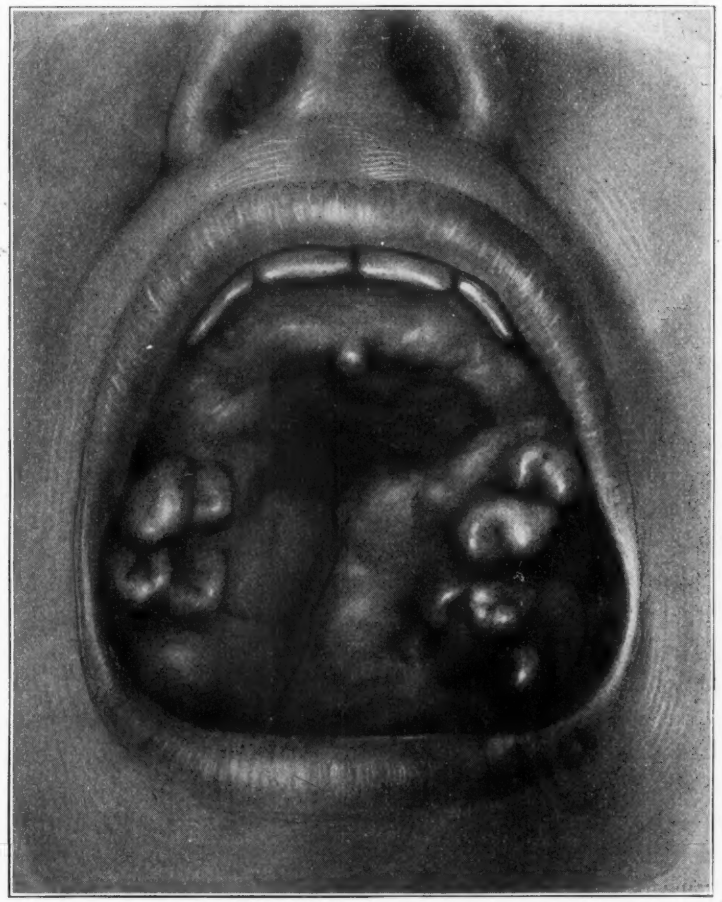


Fig. 5.—Hypertrophy of the gums.

left are not normally developed and are irregularly placed. The teeth that are absent he explains were removed because they were decayed before the present trouble began. The gums are so thickened that they protrude nearly to the level of the teeth and extend so far toward the median line that they nearly touch. The thickened mass is dense, elastic, and has the feeling of the softer varieties of keloids. (Fig. 5.)

Diagnosis.—The uniform thickening does not correspond to any definite tumor, and must be called, therefore, a hypertrophy. Epulides are circumscribed and always unilateral. Cysts sometimes affect both sides of the jaw, but they are always uniform and spindleform, never lobulated. These masses are too soft to be derived from the bone.

Treatment.—The hypertrophied masses were removed piecemeal. An area was trimmed down, and after this had healed, another area would be treated in the same way.

Pathology.—The tissue was made up of thick bundles of fibers, about a cross between elephantiasis and keloid.

After-course.—Because of the close histologic resemblance to keloid, I predicted a rapid return, but in this I was happily mistaken for as long as a year and a half after operation no disposition to recurrence was in evidence.

Comment.—The genesis of this affection seems to be a mystery.

CASE 6.—A business woman aged thirty-two consulted me because of swelling of her gums.

History.—For some months the patient has oberved a tumor developing back of the incisor teeth. It gradually extended until it covered the greater part of the area of the hard palate. The pain was rather acute in the beginning, but now it is dull with an uncomfortable sense of pressure. The chief cause of complaint is interference with mastication. She has never had trouble with her teeth.

Examination.—The tumor extends from the right lateral incisor to the left bicuspid. It extends backward halfway to the beginning of the soft palate and to below the level of the incisor teeth. It is soft and semi-fluctuating. (Fig. 6.)

Diagnosis.—The tumor has the feel of a lipoma—an indefinite pseudo-fluctuation. Lipomas do not occur in this situation, however. The mass shades gradually into the surrounding tissue which indicates an inflammatory process. If it were located elsewhere one would think at once of tuberculosis. It is at any rate a "cold" abscess.

Treatment.—When cut into a thin pus containing flocculi like tuberculous pus escaped. The bone was exposed for a considerable area, but there seemed to be no bone necrosis.

Pathology.—No culturable organism could be obtained. The slide showed a few cocci and many degenerated polynuclear leucocytes.

After-course.—After some months the abscess was entirely healed and remained so at least for many years and was well when the patient was last heard from.

Comment.—The patient was a well-nourished woman, little suggesting anything of a tuberculous nature. The infection likely was due to an attenuated pyogenic organism. I have repeatedly seen smaller abscesses from near the roots

of decayed teeth. These usually persist until the exact focus is eradicated. None such appeared here and it may be assumed that the infection gained entrance through the soft palate.

CASE 7.—A retired farmer aged seventy-two came to the hospital because of an ulcer in his palate.

History.—The patient had two sisters who died of cancer; one cancer of the larynx, the other cancer of the uterus. A month ago while eating he bit his cheek, causing a sudden sharp pain which did not subside. He consulted a doctor who discovered a white patch on the anterior pillar. This was cauterized. Despite this it continued to spread. His general health has always been good. He uses tobacco in moderation.

Examination.—There is a white patch on the anterior pillar extending to

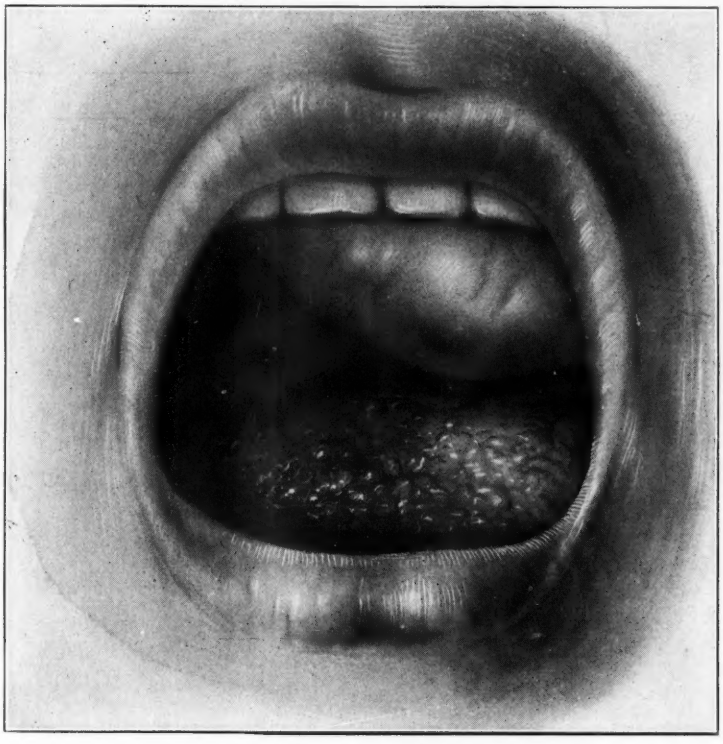


Fig. 6.—Chronic abscess of the hard palate.

the lower jaw, and over the hard palate. The surface of the area is soft but the border is raised and easily palpable. The border feels as if a tiny string of beads were embedded beneath the surface about the border. The wisdom tooth is still present and injures the affected area between it and the plate of the upper teeth. The border when irritated tends to bleed.

Diagnosis.—Obviously the affection existed before the injury above noted occurred. This event merely caused the patient to seek advice which led to its discovery. The primary state may be accepted without argument as leucoplakia. The question of importance is that of possible malignant degeneration. The raised border and the disposition to bleed makes it probable that a malignant change has occurred. A piece removed for microscopic examination failed

to show definite signs of malignancy though there were some changes in the cell forms and round-celled infiltration (Fig. 7). Cauterization was advised, but refused.

A year and a half later he returned to accept the treatment advised. During the intervening period the lesion extended somewhat, but the chief changes were noted in the border in some areas, particularly over the lower end of the pillar and on the adjoining part of the tongue. Here the border was much raised; was dense and irregular, and bled easily when manipulated with the finger. The membrane was separating at these points and an ulcer was forming.

Treatment.—Excision of the affected area was done. The cheek was split to give access to the affected region. The wound so made was closed by suture.

Pathology.—The border excised showed a distinct tendency to invade the

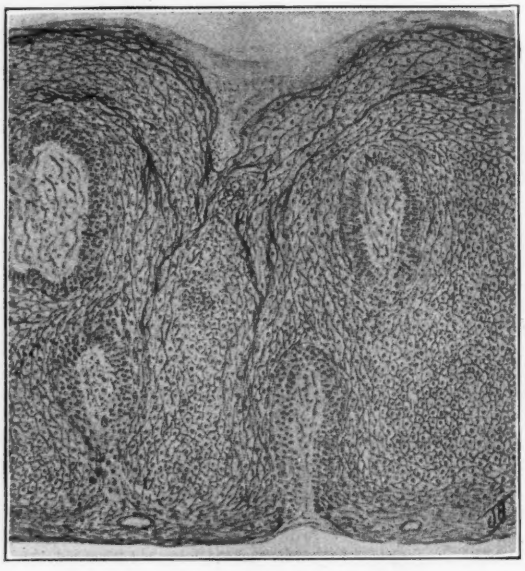


Fig. 7.—Leukoplakia, benign.

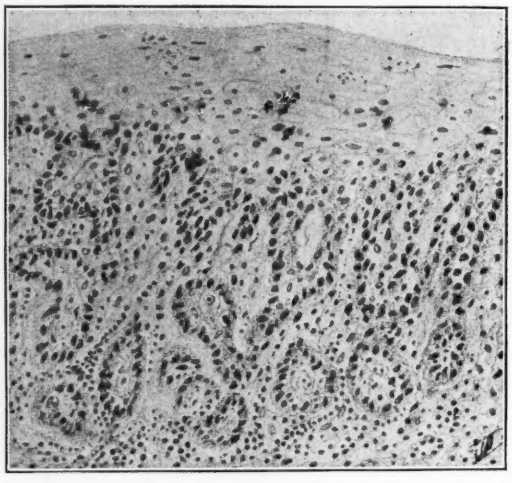


Fig. 8.—Leukoplakia undergoing malignancy.

surrounding tissue in some regions (Fig. 8) while in others the microscopic picture resembled that of a year before.

After-course.—Healing was prompt. There was no evidence of recurrence when the patient died of cerebral hemorrhage three years later.

Comment.—When these leucoplacic areas become malignant, they do so slowly and a vigorous cauterization at an early stage may be expected to effectually annihilate them. Had I to meet this indication now I should excise it with an electric knife under local anesthesia. This would lessen the operative risk materially, besides making the incision through the cheek unnecessary. I have employed this means repeatedly without recurrence. It is necessary to reach every nook and corner. Because of the extent of the lesions, this may be a very trying procedure both on the patient and to the operator.

CASE 8.—A traveling salesman aged thirty-eight came to the hospital because of a thickening of his lower jaw.

History.—The patient noticed for several years that the left side of the lower jaw was becoming thickened. It was painless and until it became great

enough to bulge the side of the cheek he neglected it. Now he seeks relief from the deformity.

Examination.—There is a spindleform enlargement on the external surface of the jaw beginning at the mental foramen and terminating at a centimeter or two in front of the angle. At its highest point it attains an elevation of about 2 cm. It is smooth, hard, and painless. The inner surface of the jaw is not affected. The mucous membrane is movable over most of its extent. The bone can not be indentated by pressure. There are no teeth missing. (Fig. 9.)

Diagnosis.—The slow growth stamps it as benign. It is evidently connected with the bone. Solid bony tumors are usually globular, the spindleform are usually cystic, combined osseous and cystic are irregular globular. This one must therefore be cystic.

Treatment.—The surface was infiltrated with novocain and the inferior

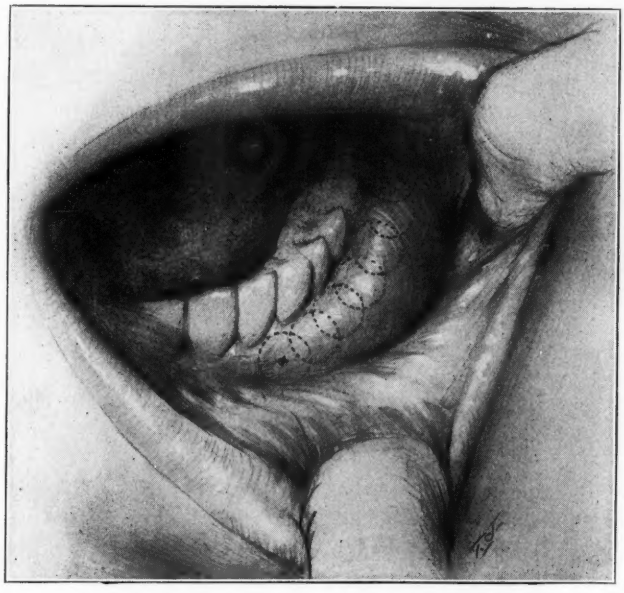


Fig. 9.—Dentigerous cyst of the lower jaw.

maxillary nerve was blocked at the lingula. The mucous membrane was incised along the most prominent part and the periosteum deflected. The shell was opened with a mastoid chisel. The excess of bony capsule was excised with a small rongeur. That portion of the cyst wall nearest the jaw was curetted. The deflected periosteal mucus flaps were then pressed into the opening and held there by a tampon.

Pathology.—The shell was composed of normal bone, the lining of squamous cells. There were no giant cells.

After-course.—More or less infection took place and some six weeks were required before the lesion was healed.

Comment.—Such simple treatment is always sufficient for this condition. They are often subjected to needlessly radical operations.

Case 9.—A man aged sixty came to me because of an ulcerated condition in the roof of his mouth.

History.—For six months he has had ulcers in the roof of his mouth, extending more or less over both the hard and soft parts. He states that a Wassermann has been made which was negative, but despite this his physician gave him several doses of salvarsan, but no improvement has resulted. The general history is not illuminating.

Examination.—The patient seems a man in good health. Save for the roof of his mouth he has no lesion of any sort. The site of complaint presents an uneven surface, resembling pictures of fields torn by shells. There seems to be no regularity except about the border, where a reniform outline, both of the individual lesion and their composite arrangement, can be made out. Some areas have healed. Those still in a state of ulceration present sharp, slightly undermined, fairly soft borders. The soft palate, as well as the hard, is affected. Nowhere is there a complete perforation. The pillars and pharyngeal walls are not affected. (Fig. 10.)

Diagnosis.—The outline of the lesions and the type of ulceration is distinctive of syphilis, and this diagnosis must be maintained despite the serum reaction and therapeutic test. The soft character of the tissue and the tendency to heal, together with the superficial character of the lesion, excludes carcinoma. Tuberculosis is more apt to attack the pillars or pharyngeal wall, but it does not produce the regular outlines found in this case.

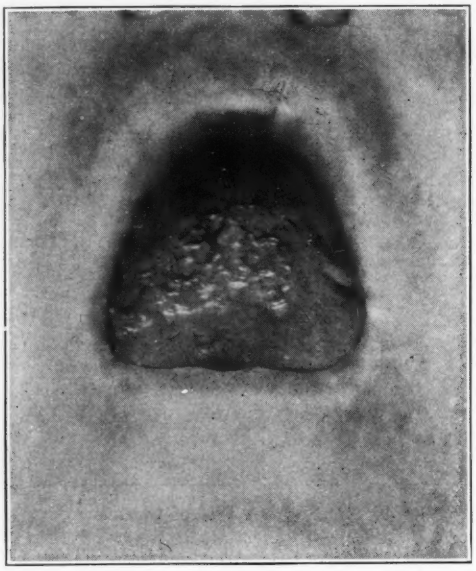


Fig. 10.—Syphilitic ulceration of the palate.

Treatment.—The vigorous prosecution of the antisyphilitic treatment was advised.

After-course.—Complete healing took place after several months' treatment with mercury and has remained so.

Comment.—When the clinical character of a lesion speaks pronouncedly for syphilis, the therapeutic test may be pushed to an extreme degree. I have seen lesions respond after 750 grains of potassium iodide were used over a pe-

riod of several weeks after doses of half this amount failed to make an impression after being given for weeks.

CASE 10.—A housewife, aged forty-six, came to the hospital because of a tumor of the upper jaw.

History.—The patient has observed the formation of a tumor on her gums for four years. It has not caused any pain, neither has it bled, but its size begins to annoy her and its esthetic effects were quite unsatisfactory to her. She has had no trouble with any of her teeth.

Examination.—A bluish-red tumor the size of a walnut occupied the external surface of the alveoli corresponding to the incisor and canine teeth. The tumor was smooth and covered everywhere with mucosa. It was constricted at its base and could be moved about somewhat. (Fig. 11.)

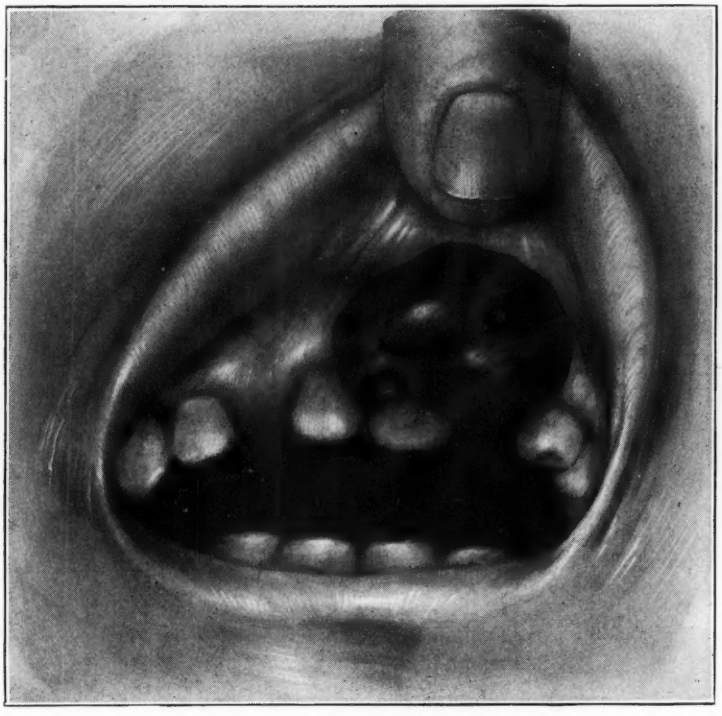


Fig. 11.—Epulis of the upper jaw.

Diagnosis.—Its site, consistency, and covering of mucosa identified it as an epulis.

Treatment.—The gingival mucosa was cut through to the bone both externally and internally, well away from the base of the tumor. The alveolar process, together with the incisor teeth, was removed with a large cutting forceps. The exposed bone was cauterized with iodine, and the wound packed to control oozing from the bone. The operation was done under local anesthesia.

Pathology.—The tumor is a giant-celled sarcoma.

After-course.—The wound healed over and has remained a smooth scar.

Comment.—Had the patient been more subservient to suggestion, I should have cut the tumor from the bone with the knife blade cautery, extracted the tooth and then have cauterized the socket. This would have left an alveolar

border which, with a bridge across the toothless space, would have left no deformity.

Epulides with a broad base of attachment along the alveolar process are more malignant and do not lend themselves to such conservative treatment. Fortunately they are usually situated farther back, and the removal of the alveolar process does not cause so much deformity.

CASE 11.—A boy aged eight was brought to me because of a tumor of the gums.

History.—Nine months ago it was noticed that the lad was developing a tumor of the gums of the upper jaw. Three months ago it was removed by the family doctor. It returned promptly, and now is larger than before the operation.

Examination.—Going out from the region of the canine tooth of the right upper maxilla is a tumor the size of a hickory nut (Fig. 12*A*). It is irregularly lobulated and surrounds the canine and bicuspid teeth. It is dense to the touch and covered with mucosa except in two places where a red fibrous mass seems to be forcing itself through the covering. The base of the tumor is sharply defined from the gums.

A *B*

Fig. 12.—*A.* Epulis of the upper jaw after removal. *B.* Epulis of the upper jaw before removal.

Diagnosis.—Its density and the fact that the covering epithelium is unaffected indicates that it is an epulis. It is too firm for a granuloma and too large. It is too sharply defined to suggest a periosteal sarcoma.

Treatment.—The alveolar border, together with the teeth, were removed (Fig. 12*B*).

Pathology.—The tumor is made up of fibrous tissue without giant cells.

After-course.—The patient remained well.

Comment.—Epulides are ordinarily semibenign tumors, but frequently,when incompletely removed, they show great malignancy, particularly those without giant cells. Usually the teeth affected must be removed to the base of their sockets. However, the small ones arising from the surface of the gums may be destroyed with a cautery and the teeth saved.

CASE 12.—A farmer aged thirty-nine came to the hospital because of a tumor of the left upper jaw.

History.—The patient first noticed a slight swelling of the gums outside of the left eye tooth three years ago. It remained stationary about a year, and then started to grow. At the end of the first year his dentist curetted the enlargement from the gum and from around the tooth roots. It remained away for six months then started to grow again and was curetted once more and burned with acid three times. In the last three months it has grown rapidly and the enlargement could then be noticed from the outside. It never gave any pain until the last few months, when a disagreeable sensation was noticed over the cheek bone. It has never bled.

Examination.—A tumor is seen extending from the alveolar process in the region of the bicuspid and molar teeth on the left side (Fig. 13). The surface is smooth and is entirely covered by epithelium. Bosselated borders widen the alveolar border half a centimeter on either side. It does not seem to extend into the antrum. There is no other evidence of involvement.

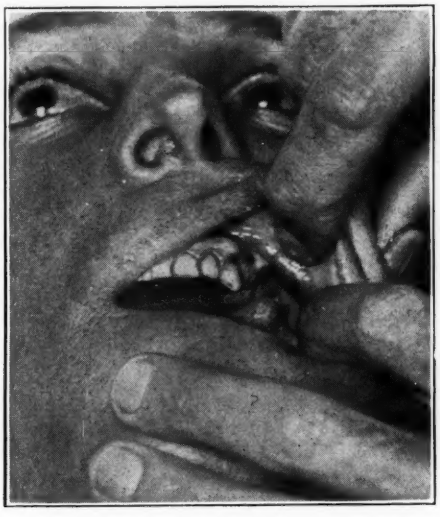


Fig. 13.—Epulis of the upper jaw.

Diagnosis.—The growth is obviously an epulis. It seems confined to the immediate environs. The patient is very desirous that removal be effected without making an incision through the cheek. The growth is so well confined that local resection seems warranted.

Treatment.—The growth was removed under local anesthesia, with a considerable free margin through the mouth. The antrum was opened into for an inch or more.

Pathology.—The slide shows the usual giant celled sarcoma.

After-course.—The wound healed, but in less than a year extensive involvement of the upper jaw had taken place. A complete resection of the upper jaw was then done but without avail. The growth returned and caused his death a year later.

Comment.—When a surgeon approaches a malignant growth he should be deaf to sentiment. A resection of the entire superior maxilla in the first place I

have no doubt would have resulted in a cure. Once an epulis has recurred, further temporizing is not permissible. This is one tumor that is curable, and if its cure is not accomplished the plans must have gone awry somewhere.

CASE 13.—A school teacher aged forty-two came because of a tumor of the gums.

History.—For three months she has noticed a small tumor growing between two of her front teeth. It has not been painful, but sometimes it bleeds. Her doctor removed a part of it and sent it to a professor of pathology in a neighboring state who returned a report of a small round-celled sarcoma. On the basis of this she comes to have a resection of the jaw. Her health is good.

Examination.—Between the canine and bicuspid teeth is a deep red fungus-like tumor the size of two grains of corn. It is soft and compressible,

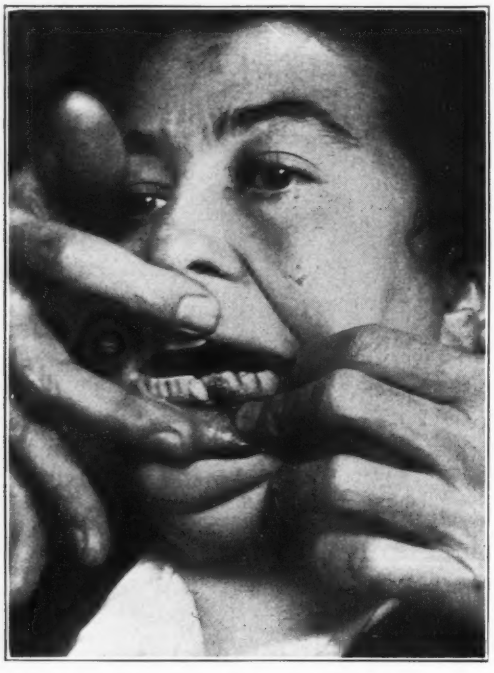


Fig. 14.—Granuloma of the alveolar border.

but quickly regains its form. Its base occupies the space between the teeth and about their roots. Bleeding follows the attempt to determine the extent of its attachment. (Fig. 14.)

Diagnosis.—It is too soft and bleeds too readily to be an epulis. Furthermore, epulides do not develop so rapidly. Its rapid growth, its vascularity and its tendency to bleed stamp it as a granuloma. Sarcoma it most certainly is not. Small round-celled sarcomas of the jaw are very rare and they involve a greater space.

Treatment.—The growth was cut off with a cautery knife blade and the site of origin carefully cauterized. The teeth were not pulled.

Pathology.—The tumor is made up of small round cells with round nuclei

and sparse protoplasm, together with many polynuclear lymphocytes. The whole is interspersed with bundles of fibrous tissue. The connective tissue was small in amount and interspersed between the cells.

After-course.—Healing was prompt and permanent.

Comment.—The error here was possible because the pathologist attempted to make a diagnosis on the microscopic picture alone. Not infrequently granulation tissue simulates sarcoma and a consideration of the clinical history must be taken into account.

DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY

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It is the object of this department to publish each month original articles on dental and oral radiography. The editors earnestly request the cooperation of the profession and will gladly consider for publication papers on this subject of interest to the dental profession. Articles with illustrations especially solicited.

CONGENITAL ABSENCE OF THE PERMANENT TOOTH BUDS

BY DR. SAMUEL HEMLEY, BROOKLYN, N. Y.

Clinical Assistant, Department of Oral Surgery, Vanderbilt Clinic, New York.

A PATIENT, a young girl, age ten, was recently referred to me for radiographic examination. Upon examination of the patient's mouth, I found that she had two permanent upper central incisors and her four six year molars,

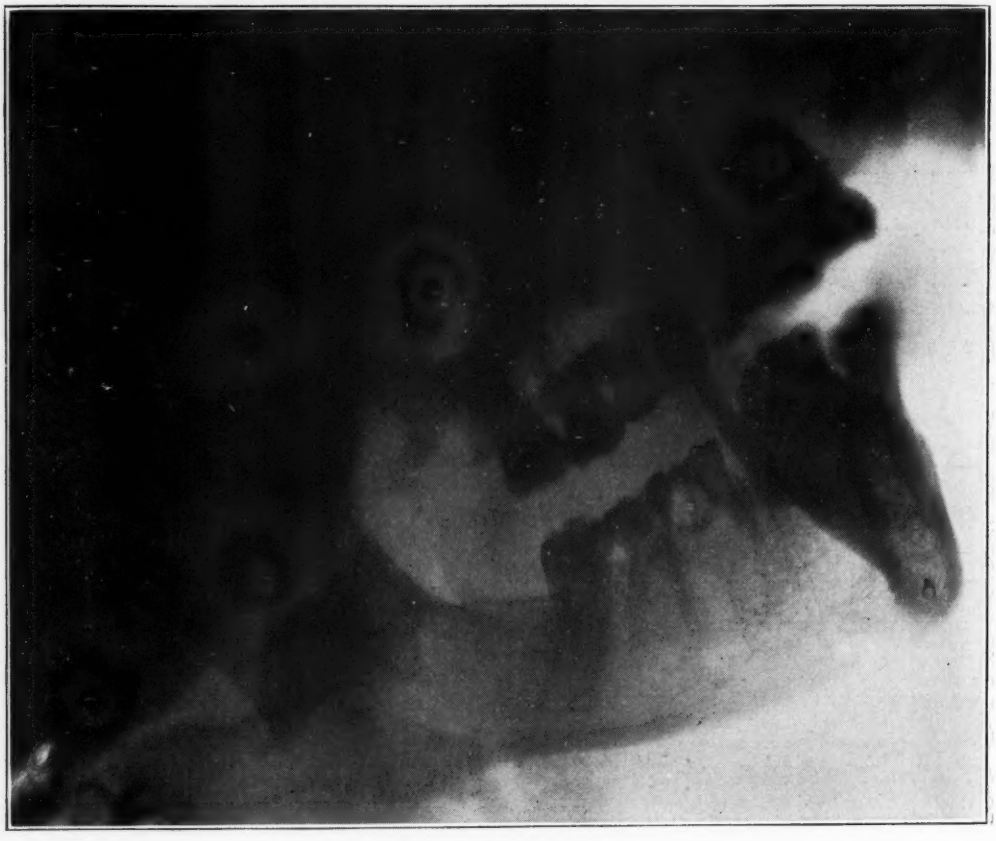

Fig. 1.—Right lateral view.

and all of her remaining teeth were of the deciduous set. I took a plate picture of each side of her head (Figs. 1 and 2), and found the buds of but two succedaneous teeth present, the lower left first premolar, and the upper left cuspid.

At a recent meeting of the American Society of Orthodontists at St. Louis, Dr. J. Lowe Young of New York spoke of a case having seventeen permanent teeth missing. Up to that time, the greatest number ever reported missing was fourteen. Dr. Ottolengui, in the *Items of Interest* of Feb. 19, 1913, reported the case of a woman of thirty-five with the following teeth absent, "in the upper jaw, two lateral incisors, the first, second and third molars on the left side, and the

Fig. 2.—Left lateral showing the bud of the lower left first premolar.

second and third molars on the right side. In the lower jaw the missing teeth are the second bicuspid and all three molars on the right side, and both bicuspids and third molar on the left side.

In the case of the patient on whom I am reporting there are twenty-four of the permanent teeth missing, as follows: In the upper jaw, on the right side, the lateral incisor, cuspid, the two premolars, and the second and third molars; on the left side, the same teeth with the exception of the cuspid. In the lower jaw, on the right side, the central and lateral incisors, cuspid, the two premolars, and the second and third molars; on the left side, the central and lateral incisors, cuspid, the second premolar, and the second and third molars. In short, the only

permanent teeth are the two upper central incisors, the four six year molars, and the buds of the upper left cuspid and the lower left first premolar.

It is quite difficult in cases of this sort to ascertain the authenticity of the case, because the patient may not recall having had some of the teeth extracted when a child. However, in this case all of the deciduous teeth having no successors are present, with the exception of the lower left second molar (Figs. 3 and 4), which was extracted about three months ago because of extensive caries.

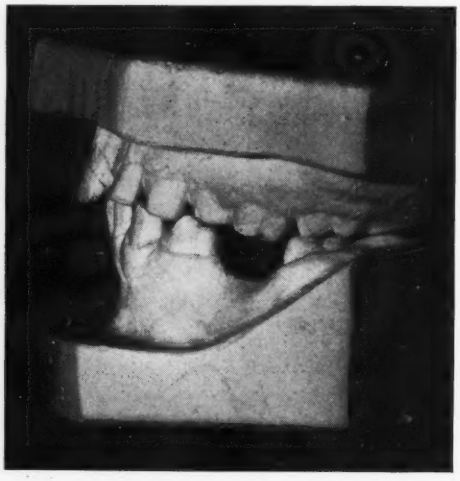

Fig. 3.

Fig. 4.

We are thus able to account for every tooth, eliminating the possibility that she may have lost some of the teeth by extraction.

The patient gives a history of having had rickets in infancy, and chorea from her third to her fifth year. She is anemic, marasmic, and of a very nervous temperament, and it was with extreme difficulty that the accompanying radiographs and impressions could be taken. The small films (Figs. 5, 6, and 7) show the upper and lower anterior teeth and the bud of the upper left cuspid somewhat more clearly than they can be seen on the larger plates.

Her younger sister, age two and one half years, has a marked distoclusion with a micromandibular development. Neither parent shows any condition which may tend to show that the condition is one of heredity.

Fig. 5.—Lower anterior teeth.

Fig. 6.—Upper left showing the bud of the cuspid.

Fig. 7.—Upper anterior teeth.

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Beginnings in Orthodontics. H. Chapman. The British Dental Journal, 1920, xli, No. 3, p. 111

The best age for the beginning of orthodontic treatment is, on an average, six years. The author emphatically states that fourteen and even twelve years of age is too late for treatment to accomplish the best results. The following reasons are given, those of lesser importance coming first, for treating orthodontic cases at six years of age: (1) It is an active period of growth. (2) Treatment probably stimulates developmental activity. (3) An enlarged oral space probably means an enlarged nasal space, and so a reduced liability to nasal stenosis and mouth breathing. (4) Early correction may prevent facial deformity. (5) If appearance of appliances is unsightly, it is of no consequence. (6) Teeth erupting into a rotated position may be guided into a normal position. (7) Places are made for erupting teeth instead of those erupting and having to be moved into correct positions later. (8) Little physical force is needed. (9) Temporary teeth are used for anchorage. Any damage to these is of less consequence than if it happened to the permanent teeth; the same applies to the other deciduous teeth and soft tissues around them. (10) Retention is simplified.

Normal occlusion should always be assumed to be the correct result to aim at, but it is open to variation under certain conditions, such as absence of permanent teeth (apart from unerupted teeth) or a state of the teeth demanding extraction as their only treatment. If a variation from the normal result is decided on, the dentist must be sure that the treatment will be simplified thereby and that the resulting occlusion will be good. In many instances the treatment of orthodontic cases is not so difficult a matter as is often believed, if they are dealt with along the lines of preventive rather than curative treatment. Experience with this work should be obtained by undertaking simple cases before treating difficult ones.

Epithelioma of the Mouth in a Young Person. P. Napier Grant. British Medical Journal, Dec. 13, 1919, ii, p. 775.

The patient was a boy not quite eighteen years of age, who in his work as an upholsterer had been in the habit of nipping threads with his teeth and filling

his mouth with tacks. A swelling formed in the left cheek and the regional teeth became loosened, so that the patient was enabled to extract the left upper second bicuspid tooth and soon afterwards the two molars on the same side. A growth of typical epitheliomatous character was found to involve the left half of the palate with an extension to the right of the middle line. The alveolar margin from the upper second bicuspid on the left side backwards was broken down; and a probe passed into the maxillary antrum, gave the sensation of having entered a rather soft mass which bled freely. The Wassermann reaction was negative. Two pieces of the growth were removed for microscopic examination, and the specimen was found to consist of two portions of rather firm pinkish-white tissue; both consisted almost entirely of squamous epithelioma of somewhat active-looking type, many of the cell processes being very fine and free from horny change, while others showed typical concentric cell nests. The treatment was surgical, in the form of excision of the left upper jaw; the diseased structures were removed as thoroughly as possible up to, and including, part of the floor of the orbit. The anterior ethmoidal cells, being involved, were cleared out. Subsequently radium was repeatedly applied in the nostril and externally below the left orbit. The patient made a good recovery from the operation, and for some months his condition was improved, but symptoms developed gradually which indicated extension of the disease to the cerebral centers, and he died less than a year later. The age at which the growth presented itself and the comparatively small amount of suffering are noteworthy features of this case.

The Value of Radium in the Treatment of Neoplasms of the Nose, Throta, and Mouth. G. B. New. Radium, 1919, xiv, No. 1, p. 12.

During the last two years at the Mayo Clinic, 211 neoplasms of the nose, throat, and mouth have been treated with radium, including 55 intra-oral tumors of the jaws and cheeks, mostly epitheliomata; 7 tumors of the palate; 24 tumors of the tongue; 27 tumors of the upper lip; and 2 tumors (angiomata) of the lower lip. In the treatment of malignancy of the jaw and cheek the growth, if surgical, is first thoroughly cauterized by slow heat cautery by means of a soldering iron. In about two weeks, radium is applied directly into the raw area. The radium is applied again in from three to four weeks and as often as necessary later. The addition of radium to the treatment has made the immediate results at the clinic much better than they have ever been before. Twenty-one cases of cancer of the jaws and cheeks were treated during the year 1917; twenty of the number have been traced; fourteen of these have had no local recurrence. In two of the fourteen cases glands of the neck have developed and block dissections have been done. In one case of primary squamous cell epithelioma of the cheek almost perforating, the tumor cleared up entirely and there has been no recurrence for more than a year. The author emphasizes that this is an unusual but nevertheless encouraging result, which calls for the use of radium in many inoperable cases. Leukoplakia of the mucous membranes of the mouth is treated with radium and the condition cleared up.

Although the immediate results of the treatment of the neoplasms of the nose, throat, and mouth with radium are as a whole very encouraging, the treatment by radium of any neoplasm that is surgical is not to be recommended. In

such cases the patient should have the benefit of both surgery and radium. The use of radium has changed entirely the prognosis in neoplasms of the nose, throat, and mouth.

The Bacteriology of Pyorrhea. L. G. Turner and A. H. Drew. British Medical Journal, 1919, i, p. 675.

The results of an experimental inquiry into the bacteriology of pyorrhea served to establish the immense importance of the mouth as a potential source of disease. The living pulp appears to become readily infected, such infection being not necessarily associated with caries in the ordinary acception of that term. Mixed infections are always associated with caries to a greater or less extent, and in a least one instance the vessels of the pulp were found to contain organisms (diphtheroids and cocci). It is certain that the dentinal tubules are frequently infected from the pulp cavity. While probably any organisms in the mouth can infect pulp, those most usually associated with dentinal infections seem to be comparatively few in number, namely, diphtheroids, cocci and spirochetes. Infection of the cementum is frequent, and three routes can be distinguished—(a) from the pulp cavity and tubules; (d) through the periodontal membrane; and (c) from surface caries. There is evidence that cementum can be infected from a living but infected periodontal membrane. A layer of bacteria is always found on the denuded roots in pyorrheal pockets, and explains the difficulty of treating pyorrhea without thoroughly cleaning all such denuded roots. In chronic cases bacteria are invariably present in the gums; the most frequent are diphtheroids, streptococci and staphylococci. In one instance a heavy infection with a sporing bacillus was observed; the gum showed chronic fibrous thickening; there was no pocketing by destruction of the alveolar dental membrane, neither was there any ulceration; apparently the bacteria gained entrance through a severely inflamed surface. A section from the gum flap overlying an empting wisdom tooth in a man of 48 years showed dental sepsis at its earliest moment; namely, just as the gum uncovered the tooth and left the crypts open to infection. Here a pure diphtheroid infection was to be seen running up the lymphatics. Sections of granulomata from the apices of teeth invariably showed the presence of microorganisms. Sections through the jaws with teeth *in situ* from cases of advanced pyorrhea showed heavy infections of the bone, a striking fact being the presence of organisms within the Haversian systems. It is noteworthy that in all chronic cases, any indication of phagocytosis was found to be absent.

Diagnosis of Paradental Cysts of the Superior Maxilla. P. Jacques. La Presse Medicale, November 19th, 1919, p. 696.

The term "paradental cysts" is applied to certain unilocular fluid tumors with serous contents, developing in the substance of the upper jaw, reaching to the root of a carious tooth, and enclosing no structural element of a crown. The author was never enabled to observe these growths in the mandible and attaches diagnostic importance to this exclusive localization in the superior maxilla. Paradental cysts may be either closed or open. The former on reaching the surgical

stage of their development, cause a deformity of the jaw in the form of a swelling of one of its walls, more or less accessible to exploration. Paradental cysts situated in the external gums result in a very striking bulge of the cheek or lip, but the use of the speculum is usually required to show the elevation of the nasal floor, frequently present in cysts derived from the incisors. Palpation yields very variable findings; the most prominent portion of the tumor may be hard and smooth like a ball of ivory or it may be as easily indented by the examining finger as a simple subperiosteal abscess. The affection most closely resembling closed paradental cyst, in its external symptoms as well as in its mode of development, deforming without perforating the outer table of the maxilla in its different portions, is mucocele of the antrum of Highmore. Information is furnished by rhinoscopy and especially by the findings on exploratory puncture. Intrabuccal transillumination shows the cyst with its serous and transparent contents, as a light spot whereas a cheek which covers a mucocele filled with a deeply colored viscid mass is marked by a dark spot. Aspiration fails to obtain material from the thickened contents of the mucocele, but it is easy to fill the syringe with a few cubic centimeters of the amber-colored serous contents of a paradental cyst. Sarcoma leads to deformities comparable to those of fluid tumors, and has a certain predilection for the region of the ascending ramus, so that it might be mistaken for a cyst derived from the lateral incisor or the eye tooth. A distinction between malignant tumors and benign growths of cystic character can usually be made on the basis of the normal condition of all corresponding teeth (paradental cysts develop only on carious teeth), adhesion and early vascularization of the tissues, a different consistence, the findings on diaphanoscopy and radioscopy. The same remarks apply to the differentiation of paradental cyst from primary epithelial cancer of the antrum of Highmore. Osteoma of the maxillary sinus is extremely hard on palpation and opaque to radioscopy. More serious diagnostic difficulties are apt to arise in the differentiation of paradental cysts from inflammatory swellings of the jaw. Open paradental cysts constitute fistulas rather than tumors of the maxilla. In these cases the wall of the cyst has been broken down by incidental or purposeful extraction of the causative root, suppurative infection of the gums, or other causes, giving access to the pyogenic mouth germs and leading to the establishment of a permanent or intermittent fistula, with a purulent or serous discharge. The fistula is always situated in the mouth, as a rule on the floor of an alveolus, frequently also on the external gums, much more rarely on the palate. Paradental cyst with fistula-formation is apt to be confused both with sinusitis and with ordinary chronic dental abscess.

Adamantinoma of the Superior Maxilla. F. Weichselbaumer. Wiener Klinische Wochenschrift, 1919, xxxii, No. 35, p. 881.

Among the tumors of the jaws, the adamantinomata (which bear this name on account of their origin from a special embryonic tissue) rank practically first in regard to rarity of occurrence. A case of this kind was recently operated upon in the surgical department of the Linz General Hospital, the patient making good recovery. Nineteen years ago, as a boy of ten years, he had been operated upon on account of a tumor in the right upper jaw, this tumor was said to have de-

veloped as a sequela of a tooth extraction and was situated in the region of the molar teeth, involving, not only the bone, but also the gingiva. It was interpreted as a fibroma and was removed as radically as possible through partial resection of the right maxilla. About seventeen years later, the patient again noticed the formation of a solid, hard tumor in the same upper jaw. This new growth bulged out in the region below the infraorbital margin and presented a nodular surface. The only remaining teeth in this half of the maxilla were the canine tooth and the two incisors. The tumor was removed, and on the basis of the microscopic findings it was interpreted as an adamantinoma presenting in some localities the histologic features of a cylindroma. Malignancy in the sense of a destructive growth was not demonstrable in this fibroepithelial tumor. The seat of predilection of these tumors is the mandible, their occurrence in the upper jaw being very uncommon. The region of the wisdom tooth is especially susceptible. The greater tendency to recurrence, noted in tumors of the upper jaw, is probably due to the fact that the maxilla can not very well be operated upon as radically as the mandible. The diagnosis usually meets with difficulties. Such new formations have often been regarded as fibromata or osteomata and even as infectious granulomata, especially in those cases in which the buccal mucosa was also involved and altered through secondary infection. According to the literature, the accurate diagnosis was permitted only by miscroscopic examination in the majority of the cases. The nodular appearance in x-ray pictures may possibly be utilized in the rendering of the diagnosis.

Adamantinomata of the upper jaw are especially rare. The author's case (which undoubtedly must be interpreted as a recurrence) probably representing the fifth known instance of maxillary as distinguished from mandibular adamantinoma. Of the latter, the literature contains about fifty cases. The tumors may develop at any time, from infancy to the fifth year. In view of the fact that they grow very slowly at first, causing practically no disturbances, their beginnings can probably be referred to the time of puberty or perhaps still earlier to the period of dentition.

Dental Sepsis in Children. Its Consequences and Treatment. F. St. J. Steadman. The Lancet, London, 1920, 1, p. 303.

The author discusses the effects of marked dental sepsis on the health of children, and the treatment of this sepsis from a broad national point of view. The former are considered under two main headings (a) general, and (b) local. Dental sepsis may have a profound effect upon the general health of the patients. A common result of oral sepsis in children is gastrointestinal derangement, as evidenced by gastric and abdominal pain, fetid diarrhea with much undigested food in the stools, marked wasting, fretfulness, night-terrors, loss of appetite, sleeplessness, and pallor of the face. Such patients frequently recover very soon after extraction of the septic teeth. Diseases such as septicemia and endocarditis may be caused through absorption into the blood stream of septic matter from the mouth. Local sequelæ of dental sepsis may occur through spreading of the infection to the adjacent parts by continuity of tissue; resulting in pharyngitis, tonsillitis, otitis media, and exceptionally in meningitis. Infection may pass down the lymphatics to the submaxillary and cervical glands. The enlarged

glands often rapidly diminish in size after the removal of septic teeth, but they do not always quite disappear. It has been shown that sepsis in the deciduous teeth not uncommonly leads to damage of the permanent teeth beneath them. The carious tender teeth by disuse bring about a gingivitis which may spread to the periodontal membrane of the permanent teeth, with all its consequent ill effect upon the health of the individual. The author points out that the above is a by no means complete picture of the possible consequences of dental sepsis in children and upon the national physique. Radical treatment is accordingly an urgent necessity, and the author extracts all deciduous teeth in which the decay is sufficiently advanced to infect the pulp. As a general rule, the antagonists of the carious teeth are also removed, because a functionless tooth, owing to the tenderness of the gum around it, due to the frequent lodgment of food-remnants is liable to prevent mastication and to reduce the pernicious habit of unilateral chewing. A marked gingivitis will develop on the unusual side, and with the establishment of the habit, the permanent teeth after this eruption will quickly become septic also. The author is convinced that many cases of periodontal disease can be traced back to tender teeth in the child. It takes a considerable amount of courage to condemn a large number of teeth in a child. This necessary courage can only be acquired by observing, recording and pondering over the evil consequences of having these septic teeth. If extensive extraction has been decided upon it is very important that the removal of the teeth should be carried out at one time under one general anesthetic, such as ethyl chloride, in order to put less strain upon the nerves of the little patient. The author can see no great objection and very little risk in extracting at one operation all the teeth requiring removal.

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EDITORIALS

The Dental Hygienist

IN the International Journal of Orthodontia, September, 1917, iii, No. 9, appeared an editorial questioning the value of dental hygienists and the possibility of instructing them according to the curriculum as outlined in one of the schools established for them about that time. All the arguments advanced then regarding the undesirability of dental hygienists still hold good, and some of the conditions which have developed within the last three years have convinced us that the possible difficulties outlined in the editorial are occurring and will continue to occur as the dental hygienist becomes more popular and more common, a condition which evidently will result on account of their being licensed by certain states.

We are now convinced more than ever that the dental hygienist is a professional mistake. She will do the dental profession no good, neither will she benefit the public to the extent believed by the men who advocate the changing of our dental laws so that the dental hygienist may become an auxiliary to the

dental profession. We say "auxiliary to the dental profession" with a certain amount of forethought, because we have been unable exactly to classify dental hygienists or to ascertain where they will be placed. The choosing of the name was more or less unfortunate, as was shown by the *British Dental Journal* in 1917, and which was referred to in our editorial in September, 1917. For example, a hygienist as described and licensed according to the dental laws in some states is entirely different from a hygienist as found in the medical profession and as understood by the laity. A hygienist in the medical profession is a man who has a medical degree and who has taken extra training and has received the degree of Doctor of Public Health or some similar designation showing that he has as much knowledge as the average physician and has specialized along the lines of public sanitation. The dental hygienist is unlike this sort of physician; in fact, there has never existed a similar class of individuals: she is neither a dentist nor a nurse, and above all things she is certainly not a hygienist. It is our opinion that in the majority of states which have passed laws recognizing dental hygienists, the dental profession has tried to keep them under its supervision and has passed laws specifying that they shall only work under the supervision of a dental practitioner. This in itself shows that the men who favored the dental hygienists do not exactly know where to place them, or perhaps are afraid of them. The dentists are willing to allow the dental hygienists to do something, but in return they (the dentists) say, "you can not do this thing that you are licensed to do, unless you do it under supervision of some one else." If the dental hygienist is qualified to polish and clean teeth above the gingival margin at all, she is certainly qualified to do this without the supervision of a dentist. Thus it would seem that men who favor the dental hygienist propaganda want to start something which will be for their own benefit and glorification and then keep it under their control.

We have mentioned the fact that the dental hygienist is neither a nurse, a dental assistant, nor a dentist. This has been proved in two instances. About a year ago a bill for the licensing of dental hygienists was sponsored by a number of men in California, among whom Dr. Guy B. Millberry was one of the chief advocates, and he tried to get a bill through the legislature, licensing dental nurses. Some one objected to the name "dental hygienist" and therefore California decided to call them "dental nurses." As a result of this bill making its appearance before the legislature, all the nurses' associations in California immediately began an active propaganda against the bill, asking that the name of "dental nurse" be changed, because they contended the so-called "dental nurse" was not an *ipso facto* nurse, and consequently was not justified in using the term. In order to overcome the activity of the nurses' associations in California, the sponsors and advocates of the bill changed the name to "dental hygienists" as a compromise to avoid the opposition of the nurses' associations. This, therefore, proves that in that instance the medical nurses did not consider the dental hygienists in their class; and we agree with them, because a medical nurse takes a thorough training extending over a period of three or four years, while a dental hygienist takes a few months' training along a limited field, and consequently is really not qualified to use the word "nurse." In an article published in December, 1919, *Dental Cosmos*, Dr. Thomas J. Barrett also calls attention to the fact that

the medical nurses through "their organization was represented at the hearings on the bills in Massachusetts and filed a strong protest before the Committee on Public Health in Massachusetts against the word 'nurse' as applied to this new species." Thus we have two examples, the one in Massachusetts and the other in California, which shows the dental hygienist is not a nurse, and is not recognized by the medical nurses as being upon an equal plane with them. However, in spite of this lack of recognition by the medical nurses, we find a number of men who would have us believe that the dental hygienist is the salvation of the human race, and unless they are licensed in all states, the public will suffer, and the health of the individual will be greatly neglected.

At the present time, in considering the dental hygienist, like other undesirable things in our midst, it is well to pause a few moments and consider why they are here, or what wonderful advantages are supposed to be gained by the licensing of dental hygienists in all states. The dental hygienist seems to be the outgrowth of propaganda relative to oral hygiene, which had its appearance several years ago in certain communities, and we remember that oral hygiene was also fostered as being the salvation of the human race and the dental profession. Later came certain infirmaries, large organizations taking care of the poor; and as a result of their activities, courses for dental hygienists were established. Consequently, after these courses were established, it became necessary that these institutions have some place where their graduates could go and practice their calling as a legalized activity. Men interested in these institutions became active in having laws passed in various states licensing the dental hygienist. It is well to inquire as to one of the probable reasons why these infirmaries were anxious to establish courses for dental hygienists. It necessarily follows in institutions of that kind that a certain number of assistants will have to be obtained to conduct the business, and it would be a much cheaper proposition to arrange a course of training for dental hygienists and have these women polish and clean the teeth of children, than it would be to employ dentists to do such work. This demonstrates why such institutions are anxious to have dental hygienists recognized. Along the same lines, we also realize why Dr. Millberry, of the University of California, was anxious to have dental hygienists licensed in California. It would enable him to select a number of women to serve as dental assistants in the clinic at the University of California; instead of paying them a salary, which regular nurses would demand, they would pay him a fee and he would be working for the advancement of the University—for the so-called advancement of the dental profession—and at the same time would provide the University dental clinic with a number of assistants that would make a very good appearance before the public. After these girls had taken their course, it would be necessary for the state board of California to license them to enable them to practice their calling.

In considering this question, we have also arrived at "why" the dental hygienist made her appearance along with the oral hygiene propaganda, and to a certain extent became a necessary adjunct in the large dental infirmary; which led those men interested in dental infirmaries to insist that she become licensed in order that they might make their courses more attractive to young women.

However, we find the dental hygienist has not only been advocated by men

who may have a direct personal interest in the affair, but by a number of other individuals who seem to believe the dental hygienist would be a wonderful thing for the general public and play a great part in public schools, and serve a useful end towards teaching oral hygiene to the public. To advance this cause, we find arguments made as to the large amount of decay in the mouths of children, to the great need for dental training in the public schools, and the education of the public. We are led to believe the dental hygienist is the only individual who can properly educate the public; when as a matter of fact, we must pause and ask, "Who is going to educate the dental hygienist?" If the dental profession is able to educate the dental hygienist, the same dental profession should be able to educate the public. Why make the education of the public such a second-hand matter? The dental hygienist is not needed to educate the public; the dental profession is perfectly able to spread such knowledge as the public may need. The answer to this argument from the dental hygienist standpoint is immediately that we have not enough dentists to take care of the need of the public, consequently the dental hygienist must be employed to fulfill that need. This to us sounds like a very weak argument, because if the public is in need of dental service and dental education, the thing to do is to provide the public with more dentists to perform that service, and not with a class of individuals who have an inferior amount of education and training.

Those who favor the recognition of the dental hygienist contend that public necessity and public welfare demand that we have dental hygienists in the public schools, hospitals, and almost every other place that they can imagine. "Provided we have them," we are inclined to ask, "what good will they do?" If the public needs dental service, a dental hygienist is certainly not the person to render that service, because all state laws limit their activity to the polishing and cleansing of the crown portion of the tooth.

We suppose this treatment is based upon the old idea that a clean tooth never decays, which is a very safe statement to make, because no one ever saw a clean tooth. We also wonder whether every one who advocates the dental hygienist is familiar with the real dental need among children, and what is really going to constitute the salvation of the teeth. In conversation with Dr. F. P. Hyatt, who is one of the most active advocates of oral hygiene, we find that as a result of an examination of a number of school children, he makes a statement that something like 53 per cent of the cavities found in first molars appear in the occlusal surface. The other 47 per cent were divided among the four surfaces of the tooth. Now the 53 per cent of cavities occurring in the occlusal surface of the first molars will never be prevented by dental hygienists or prophylactic treatment such as polishing and cleansing the teeth; it occurs as the result of anatomic defects in the enamel of the teeth. The next two most susceptible surfaces, as we remember his statement, were the buccal surface of the tooth and the mesial surface. The buccal surface decays because of an imperfect development in the buccal groove, and the mesial surface decays because of a cavity in the distal side of the deciduous molar resulting from improper attention to the decay of the deciduous molar. Consequently, the decay in the first permanent molars, which occurs on the three most vulnerable surfaces—the occlusal surface, the buccal surface, and the mesial surface, can only be prevented by dental treat-

ment such as a proper filling of the deciduous molar and prophylactic fillings placed in the occlusal surface of the first molar. The dental hygienist is not supposed to put in fillings in the deciduous teeth, or prophylactic fillings in permanent molars, consequently the greatest thing that will prevent decay of the permanent teeth in children, the dental hygienist is not permitted to do. Thus a great usefulness disappears, because any one with common sense knows that polishing the occlusal surface of the first molar in which there are anatomic defects is not going to prevent its decay.

The other argument advanced by advocates of the dental hygienist is that the public needs dental attention. We shall answer by saying: if the public and public schools need dental attention, they should be given good dental service and not something that is limited. If the poor who can not employ the services of a competent dentist are to be taken care of by the public, they certainly are entitled to the best that can be obained, and the dental hygienist is not the best. If the public is to be given anything and rendered any service, give them the best that can be obtained, give them a dentist in the public schools or in the clinic who is able to perform all services that may be needed, do all the work necessary, and thus let the people know what real dental care of the teeth amounts to.

We are aware of the fact that the statement is made that there are not enough dentists to take care of the public, and in answer to that, we can only say that conditions must be so changed as to provide enough dentists. If with the four year course and the increased educational requirement enough dentists can not be produced, the only thing that remains then, is to put the educational requirement to the point where enough dentists will be produced, or for those men who advocate the necessity of a public dental clinic, to make the public dental clinics attractive enough from the standpoint of remuneration, that men will study dentistry and avail themselves of the positions offered, as medical men now study hygiene and avail themselves of the position in the public health department.

Dr. Barrett in his article in December, 1919, *Dental Cosmos,* made the statement that to his knowledge the majority of men who advocated the dental hygienist were doing so because they claimed the public demanded them and because they were demanded in public clinics. He stated that to his knowledge the majority of dental hygienists who had graduated from various infirmaries had been taken up by men in private practice, and therefore the public was not receiving the so-called benefit that it was supposed to receive from dental hygienists.

In the March, 1920, issue of the *Dental Cosmos,* is a communication from Dr. Harry M. Beck, and he quotes a letter from Dr. Burkhart in which Dr. Burkhart states "that over 45 per cent of the graduates of this school are or have been employed in schools, hospitals, and public institutions." Admitting that 45 per cent of the graduates from the Eastman Infirmary, or "55 per cent at certain times," as Dr. Burkhart states, had been employed in schools, hospitals, and public institutions, and that Dr. Barrett is incorrect in stating that the majority of them have gone into private practice, we still contend that if they have not gone into private practice it is all the more unfortunate. If they have gone into schools, hospitals, and public institutions, the public is having forced upon it a

service which it is unable to avoid. The dental hygienist is necessarily going to render an inefficient and unsatisfactory service from the dental standpoint, because her work is limited. The general public is led to believe that the polishing of the crown portion of the tooth is the acme of dental service, when, as a matter of fact, we know it is not.

The dental hygienist in private practice is going to do much less harm than she will in hospitals and schools, because the mass of the public who are willing enough to pay for dental hygienic services in the private office have no one to blame but themselves for their being humbugged by getting inferior dental service. People who are forced to take the dental hygienist are to be pitied, because they can not help themselves; they have to take what they are given.

We find that Dr. Beck in his article in the March issue of the *Dental Cosmos* seems to have a particular grievance with Dr. Friesell and asks what Dr. Friesell is going to do to meet this problem. We suppose Dr. Beck refers to the necessity of dental education rendering service to the public, and if this is the question to which he refers, we can only say that Dr. Friesell is doing the only logical thing to meet this question by educating dentists who are qualified to render the public a dental service. We say again, that if the general public is in such need of dental service and assistance, give them dentists and not dental hygienists. Also Dr. Beck, like the usual hygienist advocate, seems to think that dental hygienists are the only solution of the problem, and that "the medical men are holding out their hands to us for help; the opportunity is here to move onward and upward." If the medical profession is looking for help from the dental profession, our sincere hope is that the dental profession will not pawn off on the medical men the dental hygienist as the solution to dental needs and dental requirements. If we are going to "move onward and upward" as Dr. Beck advocates, let us move onward and upward by rendering as great a dental service to the public and by enabling the public to have the benefit of dental service by giving them dentists and not dental hygienists.

It seems to us the advocate of the dental hygienist and the oral hygiene propaganda has absolutely befogged the issue. If the small amount of service the dental hygienist can render in polishing the surfaces of the teeth is a good thing for the public, it certainly would be a better thing for the public, to give them the entire dental service by taking care of the cavities and fillings and things that are needed. The polishing of the occlusal surfaces of the teeth is not the only prophylactic service, and consequently the dental hygienist fails in the beginning as being unable to render a service that is going to be of any great value to the public.

We mentioned in the first part of this editorial that the dental profession or those who advocate dental hygienists seem to be afraid of their own propaganda, because they insist upon the dental hygienist working under the supervision or jurisdiction of a licensed dentist. We realize that there is danger of the dental hygienists taking things into their own control, and having laws changed to make them independent of the dental profession, but this part of the argument has no fear for us and is not advocated as the reason against establishing the dental hygienist. It would probably be a good thing for the dental profession if the dental hygienist would get away from the profession and try to carry on an

independent propaganda by themselves, because then the public would very soon see that the wonderful things that they claim to accomplish are not accomplished, and the dental hygienists would simply hang themselves with their own doctrine. We wish to say that this editorial is not directed against the individuals who, unfortunately, have been led to take the course in dental hygiene and who are made to believe they are rendering a wonderful service to the public, because they have been sold something under a false pretense, and if they succeed in making anything out of it in spite of everything and the small latitude in which they have to work, they are to be congratulated and not condemned.

In closing we shall say that we are opposed to the dental hygienist propaganda because it is a false doctrine and is not benefiting the public as we are led to believe, and if the public is in need of dental service and dental education, dental clinics must be established and dentists placed in those clinics, who are able to render real service, and not some one who can render but a partial and questionable service.

ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

Meeting of the American Society of Orthodontists

The Twentieth Annual session of the American Society of Orthodontists was held at the Edgewater Beach Hotel, Chicago, Ill., April 5, 6, and 7, 1920. The session was called to order by Dr. John V. Mershon, President. The report of the Board of Censors showed the following result of the mail election: Dr. J. Lowe Young, of New York, President; Dr. Martin Dewey, President-elect; Dr. Ralph Waldron, Secretary; Dr. Bert Abell, Treasurer; Dr. Guy Hume, Member of the Board of Censors. It was practically unanimously voted to hold the next meeting at Atlantic City, N. J., some time about the first of May, 1921.

Meeting of the Alumni Society of the Dewey School of Orthodontia

The Tenth Annual Meeting of the Alumni Society of the Dewey School of Orthodontia was held at the Edgewater Beach Hotel, Chicago, Ill., April 1, 2, and 3, 1920, with the President, Dr. E. G. Weeks, in the chair. The program as prepared by the Program Committee proved exceedingly interesting. The election resulted as follows: Dr. S. W. Bradley, Ottawa, Canada, President; Major J. D. Eby, Washington, D. C., President-elect; Dr. Geo. F. Burke, Secretary-Treasurer. The time and place of the next meeting will be decided later by the executive committee.

Notes of Interest

Dr. Carl E. Ludt announces the removal of his office to 1533 David Whitney Building, Detroit, Mich., where he will practice orthodontia exclusively.

Dr. C. F. Sweet has announced the limiting of his practice to exodontia, radiodontia, and orthodontia, with offices in the Robbins Block, Minot, North Dakota.

Dr. Harvey A. Stryker announces the opening of an office at 317 Cutler Building, Rochester, New York, for the practice of orthodontia exclusively.

Dr. Joseph E. Brady has opened his office at 1145 David Whitney Building, Detroit, Mich.

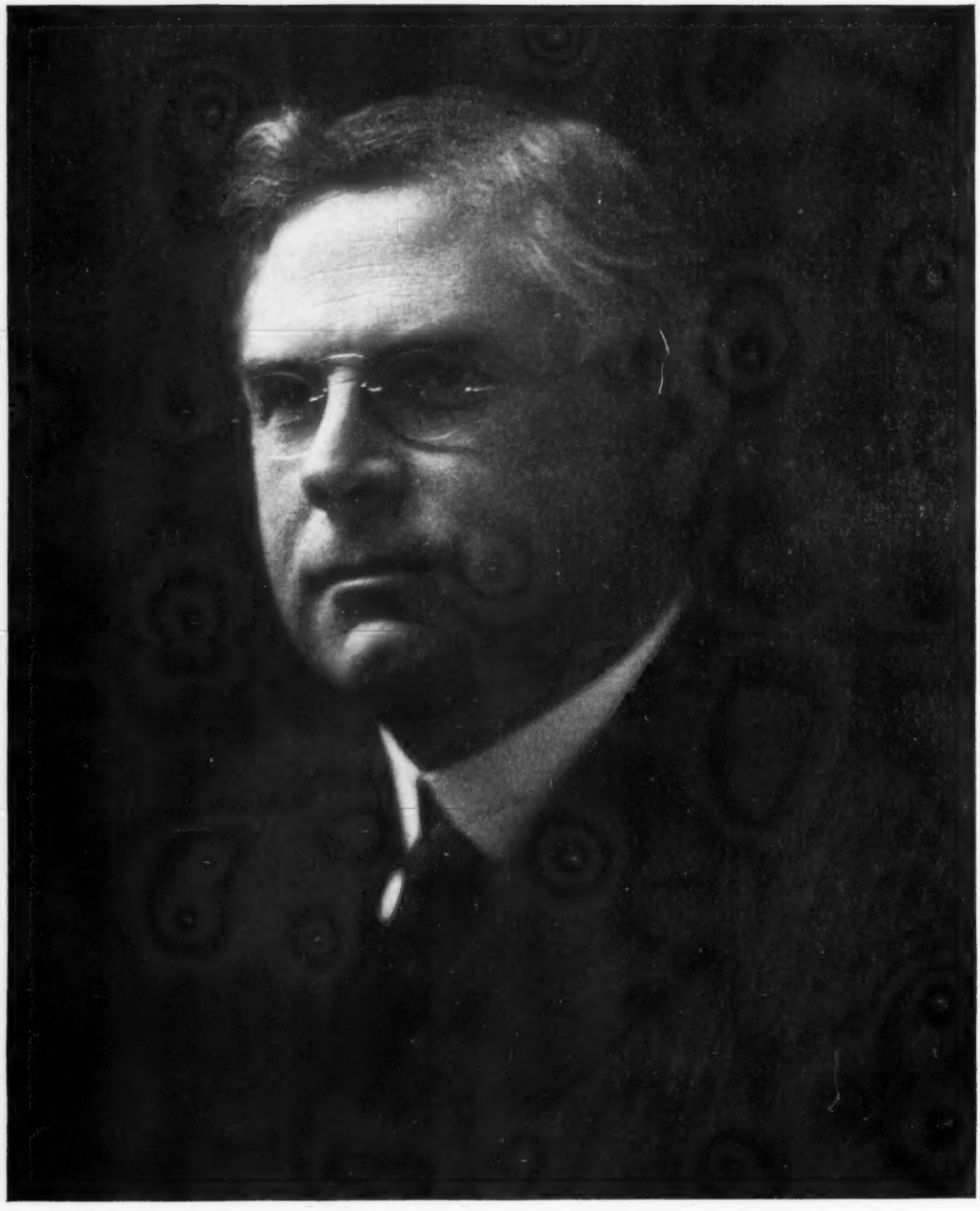
Dr. Philip L. Salzberg announces his location at 67 Hanson Place, Brooklyn, New York. Practice limited to orthodontia.

Dr. Leonard T. Walsh, Pueblo, Colorado, announces that he will limit his practice to orthodontia.

Dr. Edward A. Moeller, 899 Woodward Ave., Detroit, Mich., is specializing in orthodontia.

Dewey School of Orthodontia Scholarships

The Dewey School of Orthodontia of New York City has offered annual scholarships to the members of the Dental Corps of the Army and Navy, the selection to be made by the Surgeon Generals of the respective arms of the service.



Dr. J. Lowe Young, of New York City
President of the American Society of Orthodontists, 1920